Is Geopolitical Risk Priced?

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Abstract

We empirically analyze the relationship between geopolitical risk and the U.S. stock market, with the goal of determining if this risk is priced. The geopolitical risk indexes created by Caldara and Iaoviello (2017) and the Fama and French (2015) 5-Factor asset pricing model form the basis of our study. We insert geopolitical risk as an additional factor in the 5-Factor model to determine if geopolitical risk maintains explanatory power when controlling for other proxies of risk. The 5-factors take away most explanatory power from geopolitical risk in explaining time-series returns. We highlight though the importance of separating the effect of the level of geopolitical risk from shocks to geopolitical risk. Then, a Fama-MacBeth (1973) two-pass regression is performed to determine if geopolitical risk is priced. We find that the level of geopolitical risk related to actions is significantly priced from 1988-2016.

Keywords: Geopolitical Risk; Asset Pricing

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1 Introduction

Many risks that investors face in the stock market are systematic in nature, affecting wide portions of the market.[1] For example, natural disasters, politics, geopolitics, and macroeconomic factors generally are of this nature. Practitioners, companies, and governments recognize these risks as potentially impacting financial markets as evidenced by their inclusion in economic outlooks, financial statements, and regulatory guidelines. [2] Recently, our lack of understanding regarding the effect of these risks on financial markets has started to come to light. Kelly, Pastor, and Veronesi (2016) recognized this with regard to political uncertainty, citing "despite the salience of political uncertainty, our understanding of its effects on the economy and financial markets is only beginning to emerge." Similarly, Chen, Ross, and Roll (1986) set out to identify economic factors that systematically affect the stock market, writing that "a rather embarrassing gap exists between the theoretically exclusive importance of systematic "state variables" and our complete ignorance of their identity."

One potential "state variable" that hasn't been well-studied is the geopolitical environment. A major reason there have not been systematic empirical analyses of the impact of geopolitics on financial markets might be because there was not a common definition and measure until very recently of the risks that stem from geopolitics. Caldara and Iacoviello (2017) laid the groundwork for analysis of the impact of these geopolitical risks on financial markets by creating a common definition of geopolitical risk as "risk associated with wars, terrorist acts, and tensions between states that affect the normal and peaceful course of international relations." Based on this definition, Caldara et al. created several different indexes that capture different forms of geopolitical risk. Briefly stated, each index measures the level of geopolitical risk every month by counting the amount selected key words related to geopolitical risk appear in major newspapers.

These indexes measure the level of existent risk every month, which contrasts with shocks to geopolitical risk. Caldara et al. create a measure of shocks to geopolitical risk by modeling the difference between expected and realized geopolitical risk levels via an autoregressive process with a one time period lag. Shocks are measured as the difference between the expected level of geopolitical risk and the realized level of geopolitical risk. Though a simple model, evidence suggests this is fairly representative of how investors actually create expectations of geopolitical risks.[3] Since the creation of the geopolitical risk indexes in 2017, no literature has set out to expand upon the initial analyses per-

[1] Modern financial theory has focused on systematic influences as the source of investment risk. The view is often maintained that risk related to individual securities can be diversified away.

[2] Fidelity, BlackRock, Bank of America, and ECB

[3] Case studies by Schneider and Troeger (2006) show that any developments in armed conflicts usually come as a complete surprise to investors. Furthermore, literature on investor behavior indicates investors have short memories with geopolitical events and frequently dismiss geopolitical events as possible until they actually happen due to the extremely high stakes and costs involved.

formed by Caldara et al. on the relationship between geopolitical risk and the U.S. stock market. The driving goal of this study is to further empirical analysis by utilizing the recent advent of the geopolitical risk indexes.

Our study proceeds as follows. First, we provide an overview of literature demonstrating that geopolitical risk has been observed to impact the stock market. We proceed to highlight literature to help conceptualize what is meant by "level" of geopolitical risk versus "shocks" to geopolitical risk, along with how shocks to factors in general impact the stock market. We then outline our motivation for separating geopolitical risk into four measures: the level of geopolitical threats and the level of geopolitical actions; and shocks to geopolitical threats and shocks to geopolitical actions. Literature highlights the possibility that geopolitical actions actually work to reduce uncertainty since they stave off worst-case scenarios in the mind of investors and make the realization of the risk more predictable. Meanwhile, geopolitical threats tend to increase uncertainty over future actions. As such, we think it's important to distinguish between the two versions of geopolitical risk in any analysis.

The first question we ask is, "What is Geopolitical Risk?". Here, we focus on determining if the measures of geopolitical risk are unique from other commonly accepted proxies of risk. While Caldara et al. have demonstrated that there is a significant relationship between shocks to geopolitical risk and market returns, their study begs the question of if this risk is actually new and unique from other proxies of risk. To this end, we study geopolitical risk in the context of the Fama and French (2015) 5-factor asset pricing model. We examine the ability of each measure of geopolitical risk to explain returns of various portfolios when controlling for the 5-factors. We find that the 5-factors mostly take away explanatory power from measures of geopolitical risk in time-series regressions, though some measures appear to be more unique than others. Furthermore, we indeed observe that it is important to distinguish between effects geopolitical risk associated with threats versus geopolitical risk associated with actions

Secondly, we ask "Is Geopolitical Risk Priced?". We find in the first section the measures of geopolitical risk are largely not unique from the 5-factors in explaining returns. This does not necessarily mean that geopolitical risk cannot be priced. We use a Fama-MacBeth two-pass regression to determine the "risk premium" on each measure of geopolitical risk, which is equivalent to the price of risk. For example, if an asset is 1 unit more sensitive to geopolitical risk, the price of risk tells us how much an investor can expect to be compensated for taking on that extra risk. In accordance with standard practice in literature, we examine the price of each measure of geopolitical risk in 10 different time periods from 1988-2016, along with over the entire time period. The price of geopolitical risk tells us how much investors can expect to be compensated for taking on additional exposure to geopolitical risk. Again, by examining the pricing of each measure of geopolitical risk alongside the Fama and French 5-factors, we can determine if this risk is uniquely priced from other factors. We find that the level of geopolitical action is the only consistently priced measure of geopolitical risk.

2 Literature Review

2.1 Literature on Geopolitical Risk and the Stock Market

Several studies have determined that geopolitical events, such as war, have a real effect on trade, national income, and the growth of economies in general.[4] Naturally, a relationship then between the real economy and the stock market is often assumed. But, showing the relationship between geopolitical events, such as war, and financial markets is in actuality more complicated. Depending on the specific case and the type of geopolitical risk, the stock market has been observed to have a wide assortment of reactions. Schneider and Troeger (2006) note "the indifference or even cheerfulness with which international markets sometimes react to the escalation of armed conflicts." They specifically point to the Dow Jones gaining 17 points in the first four weeks of Operation Desert Storm and the similar reaction following the commencement of the second Iraq war. Schneider and Troeger examine the reaction of the stock market within three major case studies of armed conflict, and based on these case studies, they determine that markets "do not generally respond to the ups and downs of the three conflicts."

Others have also studied the reaction of the stock market to specific geopolitical events, often providing conflicting results. It seems that the sheer amount of unique factors to any specific geopolitical occurrence makes it difficult to draw general conclusions. For example, Obstfeld and Rogoff (1996) demonstrate that the reactions of financial markets to the Russo-Japanese war were quite limited. They posit that this was because the likely winner of the war was clear from the outset; therefore investors could accurately assign probabilities to the outcomes and were rarely faced with any major shocks. Meanwhile, as Schneider and Troeger found, the Gulf War and second Iraq war saw significant movements in the financial markets and even strong upward reactions as uncertainty dissipated when it became clear who would win. Schneider and Troeger were able to make limited general statements though that applied to all three of their case studies. Like Obstfeld and Rogoff, their cases displayed a wide range of positive and negative reactions to events with few clear patterns that ruled. [5] This is a common problem in the existing literature: without a common measure of geopolitical risk, it is difficult, if not impossible, to conduct a systematic empirical analysis of the stock market's reaction to the risks posed by geopolitics. The existing literature has had to rely on case studies to examine the effect

[4]Bloomberg, Hess, and Orphanides (2004), Glick and Taylor (2010), Organski and Kugler (1977) found that the costs of a war affect the economy for several decades.

[5]One pattern they did find though was it appeared that negative shocks were more impactful (i.e. increasing of tensions) on returns than positive shocks (i.e. treaty talks).

of geopolitical risk on the stock market.

Caldara and Iacoviello (2017) recognized this gap in our empirical understanding of the effect of geopolitical risk on both the economy and financial markets. They posited that the main reason systematic empirical analyses had not been performed was because an index that measured geopolitical risk consistently over time and captured the perspectives of the press, public, investors, and policy makers did not exist. Therefore, they created a monthly Geopolitical Risk index (GPR) ranging from 1985 to present that attempts to comparably measure the level of geopolitical risk for any given month. More specifics of the construction of this index itself will be provided in section 4.1. There are several varieties of this index that rely on counting the appearance of several key words in major newspapers. Their geopolitical risk indexes have already been cited by many companies and government institutions as an operable indicator of geopolitical risk, but there is still a lack of systematic empirical analysis of the relationship between these indexes and the stock market. Namely, the literature has not adequately addressed if geopolitical risk is unique from known proxies of risk. Furthermore, it's often assumed that only shocks to geopolitical risk impact the stock market, with little regard for a possible level effect. Lastly, the literature has not explored if geopolitical risk is priced, indicating that investors can expect to be compensated for taking on additional exposure to the risk.

Along with creating the geopolitical risk indexes, Caldara and Iacoviello have begun to show the application of their index in explaining movements in the stock market. They examine the effect of shocks to the GPR index on returns across several countries market indexes, along with its impact on world stock returns. A simple model is created where the monthly returns of each countrys market index, $r_i t$ is explained by the independent variable $GPRSHOCK_t$, which is the residual of an autoregressive process with one time period lag estimated for the GPR index every month:

$$r_{it} = u_i + \alpha_{wld} GPRSHOCK_t + \epsilon_{wld,t} \tag{1}$$

Using equation 1, they determine that GPRSHOCK almost universally depresses market returns across the countries examined, but the magnitude of this effect varies across countries. In addition to this, they create a model that examines the relationship between world-wide stock returns and the GPRSHOCK variable.

They find a statistically significant relationship between GPRSHOCK and world-wide stock returns in the 1900-2016 period of measurement, with a more significant relationship found in the 1985-2016 time period. This finding is confirmed by repeating the analysis except with the residuals of the AR(1) processes for Geopolitical Threats (GPT) and Geopolitical Acts (GPA) in place of GPRSHOCKS. The reaction of world-wide stock returns to GPASHOCKS is actually slightly positive, though not statistically significant. Meanwhile, when using GPTSHOCKS, the world-wide stock market unequivocally has a significant negative reaction. They note that returns generally respond asymmetrically to the shocks to geopolitical threats compared to the realization of those threats in the form of shocks to geopolitical action.

Finally, Caldara et al. examine the reaction of several industries in the U.S. to the 9 largest movements in the geopolitical risk indexes. Some industries, like Defense, which likely have direct exposure to geopolitical risk, experience short-term positive excess returns over the SP 500, but most industries experiences short-term negative excess returns, with all effects dissipating within three months.

As seen, Caldara et al. only examine the relationship between shocks to geopolitical risk and market returns rather than the level of risk itself. They use a simple AR(1) model to determine the expected value of risk every month and the corresponding "shock" to risk, as measured by the residual of the expected versus realized level of geopolitical risk. We now provide an overview of literature on the effect of shocks to factors on returns. Then, we examine literature that provides justification for the AR(1) model used by Calara et al. as being representative of how investors form expectations of geopolitical risk, thus permitting viewing the residuals as shocks.

2.2 Literature on Expectations and Shocks to Factors

Schneider et al. observe that there is a much more negative market reaction when an unexpected conflict occurs versus an expected conflict. This is understood with a rational expectations framework, where investors include every piece of relevant information into their decision making. If a conflict is expected to occur, this information is already incorporated into investors' decisions and therefore the occurrence of the event will have minimal impact. The only effect results from how different the realized conflict is from the expected conflict. If, however, the conflict is not expected, the realization of the conflict will have a much larger impact as the new information is incorporated into prices. Let's take an example of an expected future conflict or cooperation between geopolitical entities. If investors expect a conflict to occur, the realization of the conflict can still be different from what they expected. As Schneider et al. found in the context of armed conflict, for expected conflicts the reaction of the market depends on if the realization of the conflict was better or worse than expected, regardless of if the realization was positive (cooperative) or negative (conflictive). In all cases, they attribute any impact of events to result from the event occurring differently than expected or simply not being expected at all.

The effect of expected and unexpected events on returns is closely related to Ross' (1976) arbitrage pricing theory, where realized returns of a security are explained by the difference between the expected and realized values of factors and the corresponding sensitivity of the security to each factor. "Factor" here can refer to any measurable metric, such as the value of GDP, unemployment rate, or the level of geopolitical risk. It's helpful to visualize this in the form of a model. In equation 2, the excess returns of security i are explained by the deviation of a realized factor $\tilde{F}$ from its expected value, $\mathrm{E}[\tilde{F}]$, in time period t and the security's sensitivity, β_i, to this factor.

$$\tilde{r}_{i,t} - r_{f,t} = \alpha_i + \beta_i(\tilde{F}_t - E[\tilde{F}_t]) + \epsilon_{i,t} \tag{2}$$

Commonly, the arbitrage pricing theory assumes that only deviations in a factor impacts returns, as given in the model above. The logic goes that the value of the factor itself does not impact returns, but rather if its realization is different from its expected value. This appears to be the assumption taken by Caldara et al., where they only examine the effect of shocks to geopolitical risk on market indexes.

Since our study is largely focused on shocks to geopolitical risk, we want to establish confidence that the AR(1) model used by Caldara et al. is a reasonable method to determine shocks to geopolitical risk. Caldara et al. determine shocks to geopolitical risk rather simply. The expectation of the level of geopolitical risk is estimated for every month by relying on the most recent month and the overall trend of geopolitical risk.[6] While seemingly naive, there are no better models yet for how investors form expectations of geopolitical risk and evidence suggests that the simple model used is fairly representative of reality. Studies indicate investors have short memories when it comes to geopolitical events, often relying on the present and recent history to form expectations of future geopolitical risk. Furthermore, major clashes between large geopolitical entities seem so impossible in the current era that investors all but ignore the possibility of significant changes in geopolitical risk. Many large geopolitical risks, such as the possibility of nuclear war, don't seem to be considered by investors because the costs would be so extreme as to make portfolio reallocation useless. [7] In other words, investors aren't very forward-looking in forming their expectations of geopolitical risk. Furthermore, Schneider et al. found in their case studies that most conflictive events were not expected by the market at all, rather coming as completely unexpected. This makes sense intuitively given the nature of geopolitics, where *a priori* knowledge of terrorist attacks, nuclear weapon tests, or the decision to deploy troops in a foreign country would rarely be available to investors at large. All this points to investors heavily relying on the current level of geopolitical risk to form their expectations of future risk, which aligns with the model used by Caldara and Iacoviello. The AR(1) model adds a bit more complexity by positing that investors take into consideration the overall trend of geopolitical risk to inform their expectations, which seems reasonable to us. With this in mind, we have confidence that the AR(1) process is a reasonable methodology to determine shocks to geopolitical risk.

[6]The exact specification is given in equation 4

[7]Ferguson (2008) Kahn and Tananbaum, Council on Foreign Relations (2014)

2.3 Literature on Calculating the Price of Factors

The price of a factor, often also referred to as risk premium, indicates how much investors can expect to be compensated for taking on additional exposure to the factor. Fama and MacBeth (1973) formally test if investors expect compensation for taking on more risk. They examine the portfolio theory that the pricing of securities reflect risk-averse investors attempting to hold efficient portfolios in terms of returns and risk. "Efficient" here means that no other portfolio exists with a higher expected return and lower or equivalent risk. A risk-averse investor, therefore, would only take on additional risk if they expected to be compensated for that risk, indicated by a significant risk premium. They measure risk via securities' sensitivity to the market risk premium and then create a two-parameter model to determine if higher sensitivity to the market risk premium leads to higher expected returns (observed future returns proxy expected returns). They find a significant risk premium, where securities with higher risk are characterized by higher expected returns.

The risk premium found by Fama and MacBeth on the market factor can be translated to factor models in general. Corresponding to equation 2, expected returns of a security are determined by the sensitivity of the security to the factor and the risk premium of the factor. Thus, the more sensitive a security is to a factor, and the higher the risk premium of the factor, the higher the expected return of the security. This specification is presented in equation 3:

$$E[r_{i,t}] = r_{f,t} + \lambda_i \beta_i \tag{3}$$

Practically, this means that if a risk-averse investor knows a factor exists that affects returns, they expect higher returns for taking on a security that is more sensitive to changes in this factor.[8] A positive risk premium indicates that investors expect to be compensated for taking on more positive exposure to the factor, while a negative risk premium indicates they expect to be compensated for taking more negative exposure to the factor.

A final note is that even if a factor impacts returns, it's not guaranteed that this factor will command a significant risk premium. Some factors, though they might impact returns, do not concern investors sufficiently so as to demand a significant risk premium.[9]

2.4 Literature on Geopolitical Threats versus Geopolitical Actions

Lastly, the literature indicates the importance of separating geopolitical actions from geopolitical threats. Schneider et al. specifically examine the case of armed conflicts,

[8] The theory is based on the idea that investors must be proportionally compensated for taking on additional risk in order to prevent arbitrage.

[9] Dolinar, Orsag, Suman (2015), Bodie, Kane, and Marcus 2001, 311.

which can be thought of as geopolitical actions. They find that often the intensification of a conflict can have a positive impact on markets. Increases in conflict "whose anticipated costs lift the uncertainty over the future course of action and promise a less costly resolution of the conflict than originally anticipated" have a positive impact on the market. Thus, an increase in conflict can limit the uncertainty of possible future actions. Caldara et al. reference the findings of Schneider et al. to explain why shocks to geopolitical action appears to have a slightly positive, though insignificant, relationship with market index returns. They posit that threats increase uncertainty regarding future actions, while actions tend to decrease uncertainty. Furthermore, they think that investors might form expectations based on worst case probabilities, and actions tend to stave off some of these worst cases. Meanwhile, threats tend to create more worst case scenarios. [10] In light of this, we think it is important to disentangle the impacts of geopolitical actions and geopolitical threats in any empirical analysis. Furthermore, it's not clear to us that it's the shocks to geopolitical actions that reduces uncertainty. It's possible that a higher level of geopolitical action reduces uncertainty rather than the shock itself. For robustness, we include the level of geopolitical threats and actions in our analysis.

This motivates our use of four measures of geopolitical risk: the level of geopolitical threats, the level of geopolitical actions, shocks to geopolitical threats, and shocks to geopolitical actions.

3 Contribution to Literature

Outside of the initial analyses by Caldara et al. described, there is no literature that empirically examines the relationship between the geopolitical risk indexes and the U.S. stock market.

While Caldara et al. find some significant relationships between geopolitical risk and market index returns, their analysis begs the question if geopolitical risk maintains unique explanatory power when commonly accepted proxies of risk are controlled for. Our first contribution to the literature is to address if the impact of geopolitical risk on the U.S. stock market is unique when controlling for the Fama and French (2015) 5-factors. The model created by Fama and French (2015) is one of the most well-known and accepted asset-pricing models.[11] The factors in this five-factor model are 1) Market risk premium(Mkt-rf); 2) Small market capitalization Minus Big market capitalization (SMB); 3) High book/market ratio Minus Low book/market ratio (HML); 4) Robust Minus Weak profitability (RMW); and 5) Conservative Minus Aggressive investment

[10] Ilut and Schneider (2014)

[11] The five-factor model did not add much explanatory power to the three-factor model, but we use the five-factor model for robustness. Furthermore, they found the factor HML to be redundant in the 5-factor model.

(CMA) [12]. In the "What is Geopolitical Risk?" section, our initial analysis reveals there are some significant relationships between geopolitical risk and the 5-factors. We further investigate by examining the ability of geopolitical risk to explain returns when included alongside the 5-factors. For returns, we use 25 portfolios created by Fama and French that are sorted based on Size and Book-Market factors, which they've found to be the two most important factors in asset pricing. [13] In the "What is Geopolitical Risk?" section, these portfolios mainly operate to limit noise from individual security returns and then determine if geopolitical risk is widely unique from the Fama-French 5-factors. The portfolios provide us with a wide dispersion of returns and allow insight into if each measure of geopolitical risk affects returns across the entire stock market, despite some of the most important characteristics in explaining returns. We create several variations of a model to explain returns while controlling for the effect of the 5-factors on returns. We find that the 5-factors largely take away explanatory power from the measures of geopolitical risk.[14]

Our second contribution to the literature is separating out the impacts of the level of each geopolitical risk measure from shocks. The literature has largely assumed that only shocks to geopolitical risk will impact returns. As highlighted before, there is reason to think though that the level of risk itself might have a unique impact on returns when controlling for shocks to geopolitical risk. We find this is important in the case of geopolitical actions, where the level itself positively and significantly impacts returns when controlling for shocks.

Our third, and most important, contribution to the literature is estimating the price of each measure of geopolitical risk. The price of risk, or risk premium, is calculated by performing cross-sectional regressions on portfolio returns and the estimated coefficients of each portfolio's returns to each measure of geopolitical risk. Several versions of the cross-sectional regression are created to control for the price of the 5-factors and separate

[12]The market risk premium factor is the same as used in the traditional CAPM. According to Fama and French, the additional factors are constructed in the following way: "The Size and value factors use independent sorts of stocks into two Size groups and three B/M groups (independent 2x3 sorts). The Size breakpoint is the NYSE median market cap, and the B/M breakpoints are the 30th and 70th percentiles of B/M for NYSE stocks. The intersections of the sorts produce six VW portfolios. The Size factor, SMB_{BM}, is the average of the three small stock portfolio returns minus the average of the three big stock portfolio returns. The value factor HML is the average of the two high B/M portfolio returns minus the average of the two low B/M portfolio returns."

[13]According to Fama and French (2015) these portfolios are created as follows: "At the end of each June, stocks are allocated to five Size groups (Small to Big) using NYSE market cap breakpoints. Stocks are allocated independently to five B/M groups (Low to High), again using NYSE breakpoints. The intersections of the two sorts produce 25 value-weight Size-B/M portfolios. In the sort for June of year t, B is book equity at the end of the fiscal year ending in year t1 and M is market cap at the end of December of year t1, adjusted for changes in shares outstanding between the measurement of B and the end of December "

[14]As will be emphasized later, this finding is not surprising in light of the findings of Chen et al. They too observe that their macroeconomic factors lose much significance in explaining time-series returns when included alongside the market factor.

out the pricing of the level and shocks to each measure of geopolitical risk. We find that the level of geopolitical action is significantly and negatively priced over the entire testing period. [15]

4 Data

4.1 Geopolitical Risk Data

There are three main variations of the geopolitical risk index created by Caldara et al.: the composite Geopolitical Risk index (GPR), Geopolitical Threat index (GPT), and Geopolitical Action index (GPA). Each index ranges from January 1985 to the most recent month.[16] For the purpose of our study, we use data from January 1985-December 2016. Caldara et al. cover in depth the risks each of these indexes are intended to capture; it will suffice to provide a brief overview. We define "geopolitics" and "geopolitical risk" in the same manner as Caldara et al. Their guiding motivation is to "identify situations in which the power struggle of agents over territories cannot be resolved peacefully and democratically." To this end, they define geopolitical risk as the "risk associated with wars, terrorist acts, and tensions between states that affect the normal and peaceful course of international relations." Included within this definition are both the risks that future events will happen, called "threats", and the risks that stem from the occurrence of events themselves, called "actions".

The geopolitical risk indexes are created by counting the occurrences of articles discussing geopolitics according to their definition in major English-language newspapers. The index then is calculated by dividing the number of articles discussing geopolitical risks by the number of published articles. The indexes are normalized to a value of 100 in the 2000-2009 decade. An index value of 200 then means there are twice as many newspaper mentions of rising geopolitical risk in that month as during the 2000s. Several different sets of key words are created to search in the newspaper articles to determine if that article should be added to the index. By using different sets of key words in these searches, they are able to separate geopolitical threats in the form of the GPT index and

[15] One concern that arises from this methodology is that we do not know if there will be significant dispersion across the portfolios in the marginal effect of exposure (i.e. the estimated coefficient on geopolitical risk) to geopolitical risk on returns. To alleviate this concern, we redo the second-pass, except this time we create our own portfolios, sorted according to securities' sensitivity to each measure of geopolitical risk. This methodology directly follows that of Fama and MacBeth, where they form 20 portfolios based on securities' sensitivities to the market risk premium to determine if securities with higher risk also entail higher expected returns. With this methodology, we can ensure that the portfolios vary significantly in the marginal effect of exposure to each measure of geopolitical risk on returns. An overall agreement between these two methodologies would give us more confidence in our results. Though, as Chen et al. noted, different portfolio sorts tend to make significant results insignificant, so we do not expect complete agreement between the results of the two methodologies.

[16] Note they also create historical indexes that go back to 1900, which rely on significantly less newspapers. We choose to focus on the more contemporary time period starting in 1985.

geopolitical actions in the GPA index. As already discussed, we only examine the GPT and GPA indexes instead of the composite GPR index due to literature that indicates the importance of disentangling the effects of each.

Caldara et al. use an AR(1) model to determine shocks to these indexes every month. That is:

$$GP_t = \alpha + \gamma(GP_{t-1}) + \epsilon_t \tag{4}$$

GP_t is a stand in for a given level of geopolitical risk (GPT or GPA) in month t. A simple regression is run where the prior month, *t-1* predicts the next month's level of risk. The residual of each month, that is the difference between the expected and realized level of geopolitical risk each month, is then set as the shock to geopolitical risk (GPT or GPA) for the month. We use this same procedure to calculate the shock to GPT and GPA for every month from February 1985- December 2016.

4.2 Portfolio Return Data

We use 25 portfolios created by Fama and French as our measure of returns. These portfolios were created by sorting all securities in the CRSP universe into 5 portfolios according to their Size and 5 according to their Book-Market value. The intersection of these portfolios thus create the 25 portfolios sorted on Size and Book-Market value. [17] For example, at one extreme a portfolio contains securities with the lowest Size and lowest Book-Market values, while at the other end a portfolio contains securities with the highest Size and highest Book-Market value. We use monthly portfolio return data during the same time frame as the geopolitical risk index data is available, from January 1985 to December 2016.

In our analysis, these portfolios are labeled numerically from portfolio 25 to portfolio 1. Examining the interaction of the individual traits of portfolios with geopolitical risk is beyond the scope of this study, but certainly is a necessary area of future study. The characteristics of each portfolio are provided in the Appendix in table 11. In the first-pass regressions, these portfolios mainly operate to limit the idiosyncratic risk of individual securities. These portfolios serve a more important role in the second-pass cross-sectional regressions, where we determine the price of each measure of geopolitical risk. Here, we must have portfolios with a wide dispersion of expected returns to improve the discriminatory power of the cross-sectional tests. Chen et al. sort securities into portfolios based on Size, a well-established indicator of expected returns, to accomplish this end. Similarly, we use the Fama-French portfolios sorted on Size and Book-Market value, which they have demonstrated to have large dispersions in expected returns.

[17] Exact details are discussed in footnote 13

5 What is Geopolitical Risk?

5.1 Is Geopolitical Risk Unique?

It is possible that other factors already capture risk associated with geopolitical risk, resulting in geopolitical risk not maintaining significant explanatory power when other known proxies of risk are controlled. The unconditional correlations, along with the significance of these correlations are provided in table 1 between the four geopolitical risk measures and the 5-factors used in the Fama-French model. We see that the 5-factors mostly have significant correlations with each other. But, as Fama and French have shown, each factor still adds unique explanatory power to the model with the exception of HML, so correlations don't preclude significance in the model. Any relationship observed between the 5-factors and geopolitical risk likely stems from geopolitical risk since it's purely exogenous while the 5-factors are based on security returns.

The market risk premium factor (Mkt- rf) does not have a significant correlation with the level of GPT or GPA, but it does have a significant negative correlation with shocks GPT. The aforementioned study by Caldara et al. would lead us to expect this result– one of their major findings was that a significant relationship exists between shocks to the GPT index and world-wide stock and market index returns. Also in line with their findings, shocks to the GPA index do not have a significant correlation with the market risk premium and the correlation is slightly positive unlike the negative sign on shocks to GPT.

Table 1 Correlation Matrix

	Correlation								
	Mkt-rf	SMB	HML	RMW	CMA	GPT Level	GPT Shock	GPA Level	GPA Shock
Mkt-rf	1.0000								
SMB	0.1976	1.0000							
HML	-0.2235	-0.1248	1.0000						
RMW	-0.3651	-0.4454	0.3289	1.0000					
CMA	-0.3833	-0.0649	0.6684	0.2090	1.0000				
GPT Level	-0.0314	0.0233	-0.1225	0.0065	-0.1075	1.0000			
GPT Shock	-0.1137	0.0039	-0.0717	0.1082	-0.1004	0.6611	1.0000		
GPA Level	0.0304	0.0841	-0.1045	-0.0270	-0.0800	0.5547	0.2006	1.0000	
GPA Shock	-0.0482	0.0358	-0.0890	0.0517	-0.0838	0.4737	0.3746	0.8256	1.0000
	Significance								
Mkt-rf	1.0000								
SMB	0.0001	1.0000							
HML	0.0000	0.0133	1.0000						
RMW	0.0000	0.0000	0.0000	1.0000					
CMA	0.0000	0.1994	0.0000	0.0000	1.0000				
GPT Level	0.5345	0.6456	0.0151	0.8979	0.0332	1.0000			
GPT Shock	0.0242	0.9389	0.1558	0.0320	0.0467	0.0000	1.0000		
GPA Level	0.5482	0.0958	0.0384	0.5938	0.1131	0.0000	0.0001	1.0000	
GPA Shock	0.3403	0.4792	0.0782	0.3067	0.0971	0.0000	0.0000	0.0000	1.0000

As documented by Caldara et al., all the measures of geopolitical risk have relatively high correlations with each other as a result of them being derived from similar search words. However, as they have shown, each one still captures unique information related to geopolitical risk.

We cannot draw too many conclusions from just these correlations, but it is important to note already that it appears some relationships exist between the 5-factors and geopolitical risk.

To determine if there is still significant variation in the geopolitical risk measures from the Fama-French 5-factors, we examine the ability of geopolitical risk to explain movements in each of the 5-factors. We don't attempt to provide theory behind why geopolitical risk would affect certain factors and not others, but rather our aim is to simply establish from the outset that geopolitical risk is largely unique from the 5-factors. Table 2 provides the coefficients and significance from each measure of geopolitical risk regressed on each individual factor.

Table 2 Geopolitical Risk Regressed on Each Fama-French Factor

	Level GPT	Level GPA	GPTSHOCK	GPASHOCK
Mkt-rf				
Coeff.	-0.002	0.002	-0.012	-0.004
T-stat	-0.671	0.555	-2.013	-0.899
SMB				
Coeff.	0.001	0.004	0.001	0.002
T-stat	0.532	1.754	0.200	0.821
HML				
Coeff.	-0.005	-0.004	-0.004	-0.004
T-stat	-2.530	-1.874	-1.599	-1.750
RMW				
Coeff.	0.000	-0.001	0.006	0.002
T-stat	0.119	-0.449	2.159	0.956
CMA				
Coeff.	-0.003	-0.002	-0.004	-0.003
T-stat	-1.731	-1.258	-1.560	-1.287

Again, we see several significant relationships between geopolitical risk and the Fama-French factors, though the coefficients are all fairly small. Finally, we include all Famma-French 5-factors and regress these on each geopolitical risk measure. The specific results from this regression are not necessary to discuss, but the R^2 values range from 0.017 for the level of GPA to 0.046 for shocks to GPT. It's safe to conclude that each measure of geopolitical risk is largely unique in its variation from the 5-factors.

5.2 Geopolitical Risk as a Factor in the Fama-French 5-Factor Model

5.2.1 Methodology

Having determined that each measure of geopolitical risk is somewhat unique from the 5-factors in their variation, we now turn to asking if geopolitical risk contains unique explanatory power from the 5-factors in stock returns. As outlined in section 4.2, we use 25 portfolios created by Fama and French as our return data. The main goal of this section is to better understand the differences between the relationship of the each of the four measures of geopolitical risk (level of GPT and GPA and their respective shock measures) with returns, along with if they maintain unique explanatory power when included alongside the 5-factors. While examining if the relationship between geopolitical risk and returns varies across the portfolios is intriguing, it's beyond the scope of the current study. We test two main models. First, we include each geopolitical risk measure by itself in a time-series regression to explain portfolio returns. This specification is given in equation 5:

$$r_{pt} = \alpha_i + \gamma_p GP_t + \epsilon_{p,t} \tag{5}$$

where p=1,2,...,25

r_{pt} is the monthly returns of portfolio p from January 1985 to December 2016, GP_t is the monthly measure of geopolitical risk over the same horizon, and γ_p is the coefficient of the relationship between the returns of portfolio p and the measure of geopolitical risk. This regression is performed with each of the 25 portfolios and for each of the four measures of geopolitical risk.

Then, we add the measure of geopolitical risk alongside the 5-factors in equation 6:

$$r_{pt} = \alpha_p + \beta_p(Mkt_t - r_{f,t}) + S_p(SMB_t) + H_p(HML_t) + R_p(RMW_t) + C_p(CMA_t) + \gamma_p GP_t + \epsilon_{p,t} \tag{6}$$

where p=1,2,...,25

r_{pt} is the monthly returns of portfolio p from January 1985 to December 2016, GP_t is the monthly measure of geopolitical risk over the same horizon, and γ_p is the coefficient of the relationship between the portfolio returns and the geopolitical risk measure. β_p, S_p, H_p, R_p, and C_p are the coefficients on the 5-factors for each portfolio.

Finally, we include the level of geopolitical risk and shocks to geopolitical risk in the same regression to disentangle their effects. When the shocks and levels are included in the same regressions, we use the level of geopolitical risk in time *t-1* in place of the level of geopolitical risk in time t. The level of geopolitical risk in time t already includes the shock itself in time t, so it's necessary to disentangle the two. To avoid an errors-in-variables problem, we opt to just use the level of geopolitical risk in *t-1* instead of the estimated expected level. This isolates what can be attributed purely to the level of risk versus shocks. As discussed earlier, we think there is reason to believe that the level of geopolitical risk impacts asset returns uniquely from shocks to geopolitical risk– any model then that doesn't include both might be misspecified. Equations 7 and 8 give this specification:

$$r_{p,t} = \alpha_p + \gamma_{level_p} GPLEVEL_{t-1} + \gamma_{shock_p} GPSHOCK_t \epsilon_{p,t} \tag{7}$$

$$r_{p,t} = \alpha_p + \beta_p(Mkt_t - r_{f,t}) + S_p(SMB_t) + H_p(HML_t) + R_p(RMW_t) + C_p(CMA_t) + \gamma_{level_p} GPLevel_{t-1} + \gamma_{shock_p} GPSHOCK_t + \epsilon_{p,t} \tag{8}$$

where p=1,2,...,25

5.2.2 Results

Tables 12 and 13 display the full results in the Appendix [18] from equations 5 and 6. For ease of analysis, we summarize these results in table 3.

Table 3 Summary of Regression Results from Equations 5 and 6

	At 80% Level	At 95% level	Avg. $\widehat{\gamma}$
GPT Only	7	1	-0.0036
GPT Shock Only	24	11	-0.0149
GPA Only	4	0	0.0041
GPA Shock Only	4	2	-0.0034
GPT +Factors	5	1	-0.0002
GPT Shock+Factors	6	1	-0.0018
GPA+Factors	6	2	0.0011
GPA Shock+Factors	2	2	0.0003

In table 3, we present the number of portfolios significant at the 80 % and 95 % confidence level for each regression, along with the average estimated coefficient, $\widehat{\gamma}$, across portfolios on the measure of geopolitical risk.

The only measure of geopolitical risk where the $\widehat{\gamma}$ is consistently statistically different form 0 is shocks to GPT. However, when shocks to GPT is included alongside the 5-factors in the regression, it loses all significance. The $\widehat{\gamma}$ on shocks to GPT is still negative, but it is of much lower magnitude when included alongside the 5-factors. Both the level and shocks to GPA demonstrate a positive relationship with returns on average. Meanwhile, both the level and shocks to GPT demonstrate a negative relationship with returns. However, there is not a statistically significant relationship except when shocks to GPT is included by itself in the regression.

Tables 14 and 15 display the full results in the Appendix [19] from equations 7 and 8, where both the level of geopolitical risk and shocks to geopolitical risk are included in the same regression to isolate the effect of each. Again for ease of analysis, we summarize these results in table 4.

[18] Note for ease of presentation, we only display the coefficient and statistical significance of geopolitical risk in the model. Fama and French have already extensively studied the 5-factors in the context of these portfolios. Full results are available upon request.

[19] Again, we only display the coefficient and statistical significance of geopolitical risk in the model. Fama and French have already extensively studied the 5-factors in the context of these portfolios. Full results are available upon request.

Table 4 Summary of Regression Results from Equations 7 and 8

	At 80% Level	At 95% level	Average $\widehat{\gamma}$
GPT + GPT Shock			
GPT Level	4	0	0.0038
GPT Shock	24	16	-0.0149
GPA + GPA Shock			
GPA Level	24	22	0.0207
GPA Shock	3	1	-0.0034
GPT + GPT Shock+ Factors			
GPT Level	6	3	0.0006
GPT Shock	6	1	-0.0018
GPA + GPA Shock+ Factors			
GPA Level	12	4	0.0028
GPA Shock	2	0	0.0003

Our results when including both the level and shocks to geopolitical risk in the same regression highlight the importance of disentangling their effects on returns. Most notably, the level of GPA becomes significant in explaining returns in many of the portfolios when the 5-factors are not included. When shocks were not controlled for, the level was not significant in any portfolio. Recall, Caldara et al. also studied the relationship between market index returns and shocks to GPA. They found that shocks to GPA have a slightly positive, though insignificant relationship with returns. In light of these results, it seems that their model might be misspecified. Shocks to GPA don't seem to impact returns, but higher levels have a significant and positive relationship with returns.

When the 5-factors are included alongside the level and shocks to GPA , most of the explanatory power dissipates, though the level of GPA does maintain significance in 4 portfolios.

These results make several points clear regarding the two types of geopolitical risk, GPT and GPA, and the differences between the levels and shocks to these measures. First, geopolitical threats and geopolitical actions have different relationships with returns. The level of GPA has a significant positive relationship with returns when the shocks are controlled for. Shocks to GPT has a significant negative relationship with returns, while shocks to GPA largely is insignificant.

In all cases, including the 5-factors takes away most explanatory power. This finding is not very surprising and is similar to what Chen et al. found in their study of economic factors and the stock market. They too found that while their factors had some explanatory power in portfolio returns by themselves, much of this explanatory power was lost when the market factor was included in the time-series regression. They highlight that while the market factor was very significant in explaining time series returns, "their estimated exposures (their betas) do not explain cross-sectional differences in average returns after the betas of the economic state variables have been included." They continue that, "This suggests that the "explanatory power" of the market indices may have less to do with economics and more to do with the statistical observation that large, positively weighted portfolios of random variables are correlated." As noted, the 5-factors are created using security returns, so it is not shocking that these factors take away explanatory power from the geopolitical risk measures in the time-series regressions. Despite the loss of significance in explaining returns, Chen et al. still found many of their factors to be significantly priced.

Lastly, and closely related to the first point, it can be important to disentangle the effects of the level of geopolitical risk versus shocks to geopolitical risk, especially for GPA. We find that when controlling for shocks to GPA, the level of GPA is actually significant in explaining returns across most portfolios (when the 5-factors are not included). This can be understood within the frameworks provided by Schneider and Troeger and Ilut and Schneider. Schneider and Troeger attributed the intensification of armed conflict to reducing uncertainty and staving off worst-case scenarios, and therefore positively impacting returns. However, it's likely they were witnessing investors reacting positively to the higher level of armed conflict rather than the process of intensification itself. It seems the process of intensification, which is similar to what we call shocks to GPA, largely has no impact on returns. It doesn't appear to be as important to separate out the level and shocks to GPT. We do not attempt to add to the existing literature as to why the stock market reacts this way, but this is further evidence that it's important to separate the effects of levels and shocks to geopolitical risk.

6 Is Geopolitical Risk Priced?

6.1 2nd Pass on 25 Fama-French Portfolios

In the previous section, we confirmed the importance of distinguishing between geopolitical actions and geopolitical threats. Furthermore, we found that it might be necessary to include both the level of geopolitical risk and shocks to geopolitical risk in the same regression to isolate the effects of each. When not controlling for the 5-factors, shocks to GPT and the level of GPA are significant factors in explaining returns. However, this significance largely disappears when controlling for the 5-factors.

Now we turn to formally addressing the question, "Is Geopolitical Risk Price?". To this end, we perform a Fama-MacBeth two-pass regression to determine the price of risk, also known as risk premium, on each measure of geopolitical risk.

6.1.1 Methodology

The Fama-MacBeth two-pass regression is one of the most widely used methods for calculating the risk premium on a factor.[20] The methodology is as follows. First, we calculate

[20]Fama MacBeth (1973) first used it to determine risk premium of the market factor; Chen, Ross, and Roll (1986) used it to determine risk premium on several macroeconomic factors. Many other studies

the initial exposure of every portfolios' returns to the risk factors, in our case the 5-factors and each measure of geopolitical risk. "Exposure" here simply means the estimated coefficient from an OLS regression of portfolio returns and the factor(s).[21] These estimated coefficients then are used as the initial independent variables in the second-pass cross-sectional regressions during a 3 year Testing Period.[22] In total, we evaluate 10 unique Testing Periods as outlined in table 5. Note each Testing Period corresponds with an Initial Estimation Period, where the initial exposures of each portfolio to the geopolitical risk measures, along with the 5-factors, are estimated.[23] Then, for every month t in the Testing Period, the following cross-sectional regression is run:

16:

$$R_{pt} = \lambda_{0t} + \lambda_{\gamma,t}\widehat{\gamma_{p,t-12}} + \epsilon_{pt} \tag{9}$$

where p=1,2,...,25

The $\widehat{\gamma_{p,t-12}}$ is the initial estimated coefficient on the given measure of geopolitical risk (either level of GPT, level of GPA, shock to GPT, or shock to GPA). Note that every year this estimation is updated to include the most recent year of data. For example, in Period 1, portfolio return and geopolitical risk data from January 1985- December 1987 are used to calculate the initial $\widehat{\gamma_p}$ value for each portfolio. These $\widehat{\gamma_p}$ values are used in the 12 cross sectional regressions corresponding to the 12 months in 1988, the first year of the Testing Period. In 1989, the second year of the Testing Period, these $\widehat{\gamma_p}$ values are updated to include the year 1988 (i.e. the exposure is calculated using data from 1985-1988). Then, in 1990, the third and final year of the Testing Period, the $\widehat{\gamma_p}$ values are updated once again to include data from 1989.[24]

These cross-sectional regressions result in an estimated $\widehat{\lambda_{\gamma,t}}$ value for every month t in the Testing Period, which, like Fama and MacBeth and Chen, Ross, and Roll, we term the risk premium of risk in that month (in this case, geopolitical risk). We can then average these $\widehat{\lambda_{\gamma,t}}$ values across every month in the Testing Period to arrive at the average risk premium of geopolitical risk for the Testing Period. We then test if the average $\widehat{\lambda_{\gamma}}$, the price of risk, for each Testing period is statistically different from 0 using equation 10:

have used their methodology according to Petersen (2007).

[21] Standard procedure is 3-5 years of data to calculate the estimated coefficient.

[22] The exact length of the Testing Period varies across studies. Fama and MacBeth use a 3 year period, while Chen, Ross, and Roll use a 1 year period.

[23] The estimated coefficients are calculated in a time-series regression with the same variables that are used in the second-pass cross-sectional regression. For example, if the second-pass is only run with the estimated coefficient of the level of GPT as the independent variable, then we also calculated this coefficient with only the level of GPT as the variable in the time-series regression. Likewise, if a second-pass regression uses all the coefficients of all 5-factors along with the level and shock to GPT, then these coefficients were initially estimated alongside each other in the same time-series regression.

[24] This follows the methodology of Fama and MacBeth (1973)

$$t(\widehat{\lambda_\gamma}) = \widehat{\lambda_\gamma}/(std(\widehat{\lambda_\gamma})/\sqrt{n}) \tag{10}$$

Where n is the number of months (i.e. observations) in the Testing Period

Along with finding the average $\widehat{\lambda_{\gamma,t}}$ values and statistical significance for every Testing Period, we also find the average $\widehat{\lambda_{\gamma,t}}$ and significance over the entire period from January 1988-December 2016. As noted by Fama and MacBeth, the pricing tends to be quite volatile over short time periods. As such, they pay more attention to the significance of the risk premium over the entire time period since there is a higher sample size.

Table 5 Estimation and Testing Periods

Period #	*1*	*2*	*3*	*4*	*5*
Initial Estimation Period...............	1985-87	1988-90	1991-1993	1994-96	1997-99
Testing Period..............................	1988-90	1991-93	1994-96	1997-99	2000-02
Period #	*6*	*7*	*8*	*9*	*10*
Initial Estimation Period...............	2000-02	2003-05	2006-08	2009-11	2012-14
Testing Period..............................	2003-05	2006-08	2009-11	2012-14	2015-16

Several variations of the cross-sectional regression in equation 16 are run. Namely, a cross-sectional regression is run for every month t in the Testing Periods where the estimated coefficients on the 5-factors are included alongside that of geopolitical risk in equation 17:

$$R_{pt} = \lambda_{0t} + \lambda_{\beta,t}\widehat{\beta_{p,t-12}} + \lambda_{S,t}\widehat{Sp,t-}12 + \lambda_{H,t}\widehat{H_{p,t-12}} + \lambda_{R,t}\widehat{R_{p,t-12}} + \lambda_{C,t}\widehat{C_{p,t-12}} + \lambda_{\gamma,t}\widehat{\gamma_{p,t-12}} + \epsilon_{pt} \tag{11}$$

where p=1,2,...,25

We do not display the estimated $\widehat{\lambda}$ values and significance of the 5-factors, but we include the 5-factors to determine the risk premium on geopolitical risk when the 5-factors are controlled.[25]

Equations 16 and 17 are modified to include both the coefficients on the level of geopolitical risk and shocks to geopolitical risk in the same cross sectional-regression.[26] As we saw in section 5, the level and shocks uniquely impact returns, so it's important to disentangle their risk premiums. These specifications are given in footnote [27].

[25]Full results are available upon request.

[26]We estimate the coefficient for the level and shocks to geopolitical risk using the same specification in equation 7 and 8

[27]

$$R_{pt} = \lambda_{0t} + \lambda_{\gamma_{level},t}\gamma_{\widehat{p_{level},t}-12} + \lambda_{\gamma_{shock},t}\gamma_{\widehat{p_{shock},t}-12} + \epsilon_{pt} \tag{12}$$

and

$$R_{pt} = \lambda_{0t} + \lambda_{\beta,t}\widehat{\beta_{p,t-12}} + \lambda_{S,t}\widehat{Sp,t-}12 + \lambda_{H,t}\widehat{H_{p,t-12}} + \lambda_{R,t}\widehat{R_{p,t-12}} + \lambda_{C,t}\widehat{C_{p,t-12}} + \lambda_{\gamma_{level},t}\gamma_{\widehat{p_{level},t}-12} + \lambda_{\gamma_{shock},t}\gamma_{\widehat{p_{shock},t}-12} + \epsilon_{pt} \tag{13}$$

The Fama and MacBeth methodology provides standard errors corrected for cross-sectional correlation, but not time-series correlation. Though, a sizable portion of finance papers that use a two-parameter model do not correct for time-series correlation.[28] Petersen (2009) demonstrates that often the standard errors resulting from the Fama and MacBeth methodology are biased downward, thus upwardly biasing the significance. There are several possible methods of correcting standard errors for time-series correlation. Petersen compares many of the methods and recommends a methodology similar to Newey-West (1987) and Abarbanell and Bernard (2000). We opt to use the methodology recommended by Petersen to correct our standard errors. The resulting corrected t-statistics are presented in italics next to the uncorrected statistics that result from the Fama-MacBeth methodology.[29] The corrections largely do not change the interpretation of our results, and for ease of exposition we mostly reference the uncorrected t-statistics unless the corrected version changes the interpretation.

Finally, we are aware that we do not directly address the "errors-in-variables" problem in this methodology. However, in a simple linear regression, errors-in-variables will bias coefficients toward 0, thus reducing significance of the results. So, in the simplest form of our model, where only the estimated coefficient of geopolitical risk is included in the cross-sectional regression, any significant results we find can still be assumed to have significance when accounting for measurement errors in the independent variable. Along with this, we measure standard errors of the price of geopolitical risk by exploiting the time-series variation in the estimated price of risk for every month in the Testing Period rather than on any one price, decreasing the necessity of correcting for errors-in-variables.[30] Furthermore, accounting for errors-in-variables is less important when using monthly data than annual data, as pointed out by Franzoni (2013). Lastly, in the second cross-sectional methodology later in this section, we do more directly account for the errors-in-variables problem. General agreement then between the two methodologies will increase our confidence in the results.[31]

6.1.2 Results

First, we examine the results of the second-pass with regard to GPT. We only focus on the price and significance over the entire period in table 6. The full results for each period are presented in the Appendix in table 16.

Each Panel of the tables represents a variation of the cross-sectional regression used to calculate the average price of risk, $\widehat{\lambda_\gamma}$.

[28] Petersen (2009) found that 42 percent of finance papers published between 2002 and 2004 that used a two-parameter model did not correct the standard errors for cross-sectional or time-series correlation.

[29] We are grateful to Gow, Ormazabal, and Taylor (2010) for making their code publicly available.

[30] Franzoni (2013)

[31] We are aware of the Shanken (1993) correction for errors-in-variables. However, we had difficulty finding publicly available code to perform this correction.

Looking at Panel A,[32] we see that the level of GPT is negatively priced, with a t-statistic of -1.75 (corrected -1.54). In Panel B, shocks to GPT are also negatively priced over the entire period, though with a t-statistic of only -0.56. In Panel C, the price of the level and shocks to GPT are estimated in the same regression. Both remain negatively priced, but insignificant.

In Panels D-F, we control for the prices of the 5-factors. In Panel D, the price of the level of GPT remains negative and insignificant. Meanwhile, in Panel E the price of shocks to GPT becomes slightly positive and still insignificant. Finally in Panel F, when the price of both the level and shocks to GPT are estimated in the same regression and the 5-factors are controlled for, the price of the level of GPT verges on significance with a t-statistic of -1.90 (corrected t-statistic is -1.68.) The price of shocks to GPT remains slightly positive and insignificant.

Table 6 Entire Period Average $\widehat{\lambda_\gamma}$ Values and Significance for GPT: **Panel A** displays the average $\widehat{\lambda_\gamma}$ values when only the level of GPT is included in the regression. **Panel B** displays the average $\widehat{\lambda_\gamma}$ values when only the shocks to GPT is included in the regression. **Panel C** displays the average $\widehat{\lambda_\gamma}$ values when the level and shocks to GPT are included in the same regression. Panels D, E, and F correspond to Panels A, B, and C except that the estimated coefficients of the 5-Factors are included in the cross sectional regressions alongside the measures of geopolitical threats

Panel A			**Panel B**			**Panel C**					
$\widehat{\lambda_{\gamma_{level}}}$	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{level}}}$)	$\widehat{\lambda_{\gamma_{shock}}}$	t($\widehat{\lambda_{\gamma_{shock}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)	$\widehat{\lambda_{\gamma_{level}}}$	$\widehat{\lambda_{\gamma_{shock}}}$	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)
-12.4	**-1.75**	*-1.54*	-4.1	**-0.56**	*-0.62*	-9.4	-1.9	**-1.11**	**-0.32**	*-0.96*	*-0.30*
			Panel E								
Panel D			**Panel E**			**Panel F**					
$\widehat{\lambda_{\gamma_{level}}}$	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{level}}}$)	$\widehat{\lambda_{\gamma_{shock}}}$	t($\widehat{\lambda_{\gamma_{shock}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)	$\widehat{\lambda_{\gamma_{level}}}$	$\widehat{\lambda_{\gamma_{shock}}}$	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)
-3.3	**-0.55**	*-0.60*	-1.7	**0.54**	*0.59*	-13.4	2.6	**-1.90**	**0.58**	*-1.68*	*0.54*

Next, we turn to the results with regard to GPA, summarized in table 7. The full results are given in the Appendix in table 17. Again, each Panel represents a variation of the cross-sectional regression used to calculate the average price of the level and shocks to GPA for each Testing Period.

In Panel A, the level of GPA is negatively priced, though insignificant. Similarly, in Panel B shocks to GPA is negatively priced and insignificant. In Panel C, when the price of the level and shocks to GPA are estimated in the same regression, the price of each remains negative and insignificant.

In Panels D-F, the prices of the 5-factors are controlled for. In panel D, the level of GPA is negatively and significantly priced over the entire period, with a t-statistic of -2.23 (-2.07 corrected). In Panel E, shocks to GPA also are negatively priced, though insignificantly over the entire period. Lastly, in Panel F, the price of the level of GPA remains negative and significant with a t-statistic of -2.46 (-2.18 corrected), while the price of shocks to GPA remains negative and insignificant.

[32]Note the contents of each Panel are described in the title of the table.

Table 7 Testing Period Average $\widehat{\lambda_\gamma}$ Values and Significance for GPA: **Panel A** displays the average $\widehat{\lambda_\gamma}$ values when only the level of GPA is included in the regression. **Panel B** displays the average $\widehat{\lambda_\gamma}$ values when only the shocks to GPA is included in the regression. **Panel C** displays the average $\widehat{\lambda_\gamma}$ values when the level and shocks to GPA are included in the same regression. Panels D, E, and F correspond to Panels A, B, and C except that the estimated coefficients of the 5-Factors are included in the cross sectional regressions alongside the measures of geopolitical action

Panel A			Panel B			Panel C					
$\widehat{\lambda_{\gamma_{level}}}$	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{level}}}$)	$\widehat{\lambda_{\gamma_{shock}}}$	t($\widehat{\lambda_{\gamma_{shock}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)	$\widehat{\lambda_{\gamma_{level}}}$	$\widehat{\lambda_{\gamma_{shock}}}$	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)
-7.9	**-0.97**	*-0.83*	-5.5	**-0.57**	*-0.51*	-5.0	-9.5	**-0.64**	**-1.13**	*-0.55*	*-0.91*

Panel D			Panel E			Panel F					
$\widehat{\lambda_{\gamma_{level}}}$	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{level}}}$)	$\widehat{\lambda_{\gamma_{shock}}}$	t($\widehat{\lambda_{\gamma_{shock}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)	$\widehat{\lambda_{\gamma_{level}}}$	$\widehat{\lambda_{\gamma_{shock}}}$	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)	t($\widehat{\lambda_{\gamma_{level}}}$)	t($\widehat{\lambda_{\gamma_{shock}}}$)
-16.0	**-2.23**	*-2.07*	-7.5	**-1.10**	*-1.13*	-16.8	-7.7	**-2.46**	**-1.27**	*-2.18*	*-1.13*

6.1.3 Discussion and Implications of Results

In tables 6 and 7, we see that the level of GPA is the only measure that is significantly priced over the entire period. Notably, in the time-series regressions in section 5,"What is Geopolitical Risk?", we also found that the the level of GPA most often maintains unique explanatory power of returns when included alongside the 5-factors (and shocks to GPA are controlled for). In the Appendix table 17, we observe that in the vast majority of Testing Periods, across all versions of the cross-sectional regression, the level of GPA is negatively priced. However, only for a couple periods is this pricing significant. This is not shocking though. Fama and MacBeth also observed that the market risk premium is only priced in a couple of their Testing Periods. They attribute this to the low sample size and resulting higher variation in pricing that occurs within the individual time periods. The overall time period then has a lower variation in pricing due to the higher sample size–like them, we were most interested in if the risk is priced over the larger time period.

What does this negative risk premium on the level of GPA mean? Technically, it means that portfolios with a more negative exposure to the level of GPA in one time period tend to also have higher observed returns in a future time period, ceteris paribus. As is common practice in the literature, we use actual observed future returns as a proxy for "expected" returns. Recall that in a factor model we calculate expected returns by multiplying the sensitivity of a portfolio to a factor by the risk premium of the factor.[33] So if a factor has a negative risk premium, portfolios with a more negative exposure have higher expected returns, ceteris paribus. (or more literally, are observed to have higher returns in the future). For example, the price of the level of GPA is -73.46 for the 2003-2005 Testing Period. In the previous estimation period, 2000-2002, the most negative portfolio exposure to the level of GPA was -0.0274. Ceteris paribus, we then would expect this portfolio to return 2 percent more per month than if it had 0 exposure to the level of GPA! Obviously this is an extreme example–the 2003-2005 period had one

[33]See equation 3

of the largest magnitude prices of the level of GPA and we are using the most negatively exposed portfolio. On average, portfolios had an exposure of 0.0026 during the 2000-2002 estimation period. Multiplying this by the price of -73.46 in the 2003-2005 Testing Period, the average portfolio is expected to return 0.19 percent less per month, or 2.30 percent annualized, in the 2003-2005 period than if it had no exposure to the level of GPA. This isn't enormous, but it is not insignificant.

Let's also look at the price of the level of GPA over the entire period, which is -16.8. From 2015-2016, we find that the most negative portfolio exposure to the level of GPA was -0.0280. Meanwhile, the most positive portfolio exposure to the level of GPA was 0.030. Multiplying the price of risk by the exposures, we find that the most negatively exposed portfolio expects to return .974 percent more per month than the most positively exposed portfolio. Again, this is an extreme case, but it demonstrates well that investors might pay attention to their portfolio's exposure to the level of GPA in light of these results. We could perform a similar analysis with each measure of geopolitical risk, but the level of GPA is the most significantly priced so we end our analysis here. The main takeaway is that the price of the level of GPA is high enough, and portfolios are exposed enough, to possibly make a tangible impact on expected returns.

We don't posit a theory for why the risk premium is negative instead of positive. All that we can say for certain is that, based on historical data, the exposure of a portfolio to the level of GPA has a statistically significant impact on that portfolio's future returns even when controlling for known proxies of risk. Indeed, at first glance it might seem odd that a portfolio with a more positive exposure to the level of GPA in one period expects lower returns in future periods in light of the finding earlier that higher levels of GPA have a positive relationship with returns. So why doesn't a more positive exposure to the level of GPA lead to higher returns? One explanation might be that higher levels of GPA in one period also result in more shocks to GPT in future periods, which we have seen generally depress returns. Caldara and Iacoviello observe that shocks to GPA also tend to lead to future shocks to GPT, as the intensification of action is accompanied by the intensification of threats. If a portfolio that was highly positively exposed to the level of GPA is correspondingly negatively exposed to shocks to GPT, this portfolio would demonstrate the results observed. We do not formally test if higher levels of GPA leads to more shocks to GPT in the future, but this would be an interesting area of future study.

Another possible interpretation is that lower levels of geopolitical action increase uncertainty. Investors who want protection against this possibility will place a relatively higher value on assets whose price increases when the level of action decreases and such assets will carry a negative risk premium.[34]

Neither shocks to GPT or to GPA are significantly priced over the entire period in any

[34]This is more in-line with how Chen et al. interpret their results.

of the Panels. The price of shocks to GPA nears significance over the entire time period when controlling for the prices of the 5-factors and the level of GPA, with a t-statistic of -1.27. As we will see when a different version of portfolio sorts is used in the second methodology, the price of shocks to GPA becomes significantly and negatively priced over the entire period in some versions of the cross-sectional regression.

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6.2 2nd Pass on Portfolios Formed on Exposure to Geopolitical Risk

For robustness, we redo the 2nd pass except now we create our own portfolios based on securities' exposures to each measure of geopolitical risk. This ensures that there is a significant dispersion amongst the portfolios in their marginal exposure to each measure of geopolitical risk. Our methodology directly follows Fama and MacBeth (1973), with a few modifications to fit our purposes. Our task is very similar to theirs, where they examine the price of risk (in their case market risk) based on the sorting of securities into portfolios according to their sensitivity to this risk.

6.2.1 The Playing Field of Stocks

Our investable universe consists of all stocks in the Center for Research in Security Prices (CRSP) database. This includes the NYSE, NYSE MKT, NASDAQ, and NYSE Arca stock exchanges.[35] This is the same pool of securities used by Fama and French to form the 25 portfolios used in the previous methodology. The monthly adjusted prices, as measured by the last day of the month, for each of these securities is pulled from January 1985 to December 2016. The simple monthly returns for each stock then is calculated.

6.2.2 Creating the 20 Portfolios

Fama and Macbeth created portfolios by ranking individual security's sensitivity to the market risk premium. The resulting $\widehat{\beta_i}$ value of each security then determined which portfolio it was placed in. The $\widehat{\beta_i}$ is the result of the typical Capital Asset Pricing Model (CAPM), where:

$$r_{i,t} = \alpha_i + \beta_i(Mkt_t - r_{f,t}) + \epsilon_{i,t} \tag{14}$$

In equation (14), $r_{i,t}$ is the return on asset i in time t, $(Mkt_t - r_{f,t})$ is the market risk premium in time period t, and β_i is the exposure of the security to this risk.

Likewise, we calculate the exposure of each security every year to geopolitical risk by simply finding the coefficient from a time-series OLS regression of three years of returns

[35] CRSP website

as the regressand and one of the geopolitical risk measures from the same period as the regressor. This specification is given in equation 15:

$$r_{i,t} = \alpha_i + \gamma_i GP_t + \epsilon_{i,t} \tag{15}$$

Where $r_{i,t}$ is the return of security i in month t and γ_i is the coefficient describing the relationship between the returns of security i and the measure of geopolitical risk. The term GP_t is the measure of geopolitical risk and is a stand-in for the four measures of geopolitical risk (level of GPT and GPA and shocks to GPT and GPA).

Like Fama and MacbBeth, we rank every security into 20 portfolios depending on their exposure to the given measure of geopolitical risk. This guarantees a wide dispersion in the marginal exposure of each portfolio to geopolitical risk. In total, we create 4 sets of 20 portfolios. Each set is sorted on one of the four measures of geopolitical risk.

Using a two-parameter model results in an "error-in-variables" problem since we cannot know the true γ_i value of every security, and we more directly address this problem with this methodology. If the errors of the $\widehat{\gamma_i}$'s are substantially less than perfectly correlated, the estimated γ's of portfolios, $\widehat{\gamma_p}$, can be much more precise estimates of true γ's than those of individual securities[36]. Blume (1970) demonstrates that the γ of a portfolio is simply equal to the weighted average of the individual security γ's within the portfolio.

Furthermore, as observed by Fama and MacBeth, this procedure of ranking individual securities based off their $\widehat{\gamma_i}$'s can result in a regression phenomenon. In a cross-section of $\widehat{\gamma_i}$'s, large $\widehat{\gamma_i}$ will tend to overstate the true value of γ_i while small $\widehat{\gamma_i}$ will tend to be below the true value of γ_i. These portfolios that we form on the rankings will cause a bunching of positive and negative sampling errors in portfolios. Like Fama and MacBeth, to avoid a regression phenomenon, we use one time period, the Portfolio Formation Period, of data to estimate the individual security $\widehat{\gamma_i}$ values that are used to rank and form the portfolios. Then, we use a subsequent period, the Initial Estimation Period, to recalculate the $\widehat{\gamma_i}$ for securities in each portfolio. Averaging these recalculated $\widehat{\gamma_i}$s within each portfolio, we arrive at the $\widehat{\gamma_p}$ for each portfolio p. Finally, these $\widehat{\gamma_p}$s are used as the initial independent variables in another subsequent period, the Testing Period, where the price of each measure of geopolitical risk is measured for that period.

For example, we use the Portfolio Formulation Period of January 1985-December 1987 to estimate and rank the $\widehat{\gamma_i}$'s of every security into the 20 portfolios. Then, these rankings are maintained in the Initial Estimation Period of January 1988-December 1990, where the $\widehat{\gamma_i}$'s are recalculated using the return and factor/geopolitical risk data from this Initial Estimation Period. Then averaging these recalculated $\widehat{\gamma_i}$s within each portfolio, we arrive at the $\widehat{\gamma_p}$ for each portfolio.

These $\widehat{\gamma_p}$'s serve as the initial independent variables in equation 16 seen before. Each

[36]Fama and MacBeth (1973)

portfolio $\widehat{\gamma_p}$ is updated every year of the Testing Period, such that the $\widehat{\gamma_p}$'s in the first year of the Testing Period 1991-1993 are based off data from January 1988-December 1990; the $\widehat{\gamma_p}$'s in the second year of the Testing Period are calculated off data from January 1988-December 1991; and in the third year off data from January 1988-December 1992. In total, we have 9 periods, each consisting of a unique Portfolio Formation, Initial Estimation, and Testing Period.[37] Fama and MacBeth require that for a security to be included, it must have available data for the entire Initial Estimation Period and the majority of the Portfolio Formulation Period, along with being available in the first month of the Testing Period. We modify this slightly by simply requiring a security that exists in all months of the first year of the Testing Period to exist in all months of the Portfolio Formulation and Initial Testing Period to be included. Table 8 lays out the time-periods that each Period consists of and the corresponding number of securities meeting the data requirement for that Period. In all periods, we are examining significantly more securities than Fama and MacBeth did as a result of including all securities in the CRSP universe.

Table 8 Portfolio Periods

Period #	*1*	*2*	*3*	*4*	*5*
Portfolio Formulation.............................	1985-87	1988-90	1991-93	1994-96	1997-99
Initial Estimation Period.............................	1988-90	1991-1993	1994-96	1997-99	2000-02
Testing Period.......................................	1991-93	1994-96	1997-99	2000-02	2003-05
Securities Available in First Year of Testing	6179	7306	8270	7362	6400
Securities Meeting Data Requirement........	2835	3362	3010	3307	3565
Period #	*6*	*7*	*8*	*9*	
Portfolio Formulation.............................	2000-02	2003-05	2006-08	2009-11	
Initial Estimation Period.............................	2003-05	2006-08	2009-11	2012-14	
Testing Period.......................................	2006-08	2009-11	2012-14	2015-16	
Securities Available in First Year of Testing	6293	6259	6258	6665	
Securities Meeting Data Requirement........	3491	3505	3625	3911	

We run the same cross-sectional regression seen before for every month t in the Testing Period:

$$r_{pt} = \lambda_{0,t} + \lambda_{\gamma,t}\widehat{\gamma_{p,t-12}} + \epsilon_{p,t} \tag{16}$$

where p=1,2,...,20

Note again that the portfolio returns used are based on the set of portfolios sorted on the same measure of geopolitical risk that appears in the right-hand side of the cross-sectional regression. $\widehat{\gamma_{p,t-12}}$ is the average of the $\widehat{\gamma_i}$'s within portfolio p as discussed before. These values change every year of the Testing Period as the Estimation Period is updated to incorporate the most recent year of data.

Every month t of the Testing Period then results in a $\widehat{\lambda_{\gamma,t}}$. By averaging these across every month in the Testing Period, we arrive at the average $\widehat{\lambda_\gamma}$ for the Testing Period.

[37]Note we have one less testing period now than in the previous methodology. This is necessary since we have a Portfolio Formation, Initial Estimation, and Testing Period. Our data for geopolitical risk begins in January 1985, so the first Testing Period begins in January 1991.

We test for significance again using equation 10.

Again, we include the 5-factors alongside the measures of geopolitical risk in the cross-sectional regression for every month t in the Testing Period:

$$r_{p,t} = \lambda_{0t} + \lambda_{\beta,t}\widehat{\beta_{p,t-12}} + \lambda_{S,t}\widehat{Sp,t-}12 + \lambda_{H,t}\widehat{H_{p,t-12}} + \lambda_{R,t}\widehat{R_{p,t-12}} + \lambda_{C,t}\widehat{C_{p,t-12}} + \lambda_{\gamma,t}\widehat{\gamma_{p,t-12}} + \epsilon_{p,t} \quad (17)$$

where p=1,2,...,20

Akin to the calculation of the $\widehat{\gamma_p}$'s discussed above, we also calculate the average portfolio coefficient for each factor in the 5-factor model during the Initial Estimation Period.[38] These are then tested alongside $\widehat{\gamma_p}$'s as explanatory variables to determine if measures of geopolitical risk are priced when controlling for the price of the 5-factors.

Finally, we modify equations 16 and 17 to include both the level of geopolitical risk and shocks to geopolitical risk in the same cross-sectional regression, as seen in footnote 6.1.1.

Again, we correct the standard errors for time-series correlation. The resulting corrected t-statistics are displayed in italics next to the t-statistics resulting from the Fama-MacBeth methodology.

6.2.3 Results

As before, we summarize the results regarding GPT in table 9. In the Appendix, table 18 provides the full results for each Testing Period.

In Panel of A,[39] the price of the level of GPT is slightly positive and insignificant over the entire period. In Panel B, shocks to GPT are likewise slightly positive and insignificant over the entire period. In Panel C, when the price of the level and shocks to GPT are estimated in the same regression, the price of the level of GPT is positive and insignificant. Meanwhile, the price of shocks to GPT is negative and insignificant.

In Panels D-F, the prices of the 5-factors are controlled for. In Panel D, the price of the level of GPT is slightly negative and insignificant. In Panel E, the price of shocks to GPT is slightly positive and insignificant. In Panel F, the price of the level of GPT is positive and insignificant while that of shocks to GPT is negative and insignificant.

[38] These are not displayed, but are available upon request.
[39] Again, more detailed descriptions of each Panel are contained in the title of the table.

Table 9 Entire Period Average $\widehat{\lambda_\gamma}$ Values and Significance for GPT, Portfolios Formed on Exposure to Level or Shocks to GPT: **Panel A** displays the average $\widehat{\lambda_\gamma}$ values when only the level of GPT is included in the regression. **Panel B** displays the average $\widehat{\lambda_\gamma}$ values when only the shocks to GPT is included in the regression. **Panel C** displays the average $\widehat{\lambda_\gamma}$ values when the level and shocks to GPT are included in the same regression. Panels D, E, and F correspond to Panels A, B, and C except that the estimated coefficients of the 5-Factors are included in the cross-sectional regressions alongside the measures of geopolitical threats. In all cases, the portfolios used in the cross-sectional regression are formed based on the measure of geopolitical risk used as the independent variable. For example, the portfolio returns used in Panel A are based off portfolios sorted according securities' exposures to the level of GPT.

Panel A			Panel B			Panel C					
$\widehat{\lambda\gamma_{level}}$	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{level}}$)	$\widehat{\lambda\gamma_{shock}}$	t($\widehat{\lambda\gamma_{shock}}$)	t($\widehat{\lambda\gamma_{shock}}$)	$\widehat{\lambda\gamma_{level}}$	$\widehat{\lambda\gamma_{shock}}$	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{shock}}$)	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{shock}}$)
5.9	**0.53**	*0.48*	6.2	**0.96**	*0.95*	10.8	-2.4	**1.55**	**-0.35**	*1.40*	*-0.30*

Panel D			Panel E			Panel F					
$\widehat{\lambda\gamma_{level}}$	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{level}}$)	$\widehat{\lambda\gamma_{shock}}$	t($\widehat{\lambda\gamma_{shock}}$)	t($\widehat{\lambda\gamma_{shock}}$)	$\widehat{\lambda\gamma_{level}}$	$\widehat{\lambda\gamma_{shock}}$	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{shock}}$)	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{shock}}$)
-1.8	**-0.17**	*-0.17*	4.9	**0.91**	*0.79*	10.8	-5.5	**1.52**	**-0.59**	*1.42*	*-0.54*

Table 10 displays the results with regard to GPA. Again, the full results can be found in the Appendix table 19

In Panel A, the price of the level of GPA is negative and insignificant. Similarly, in Panel B the price of shocks to GPA are negative and insignificant. In Panel C, when the price of the level of GPA and shocks to GPA are estimated in the same regression, the price of the level of GPA is positive and insignificant and the price of shocks to GPA is negative and insignificant.

In Panels D-F, again the prices of the 5-factors are controlled for. In Panel D, the price of the level of GPA is negative and insignificant. In Panel E, the price of shocks to GPA is negative and significant, with a t-statistic of -2.25 (-2.11 corrected). Finally, in Panel F the price of the level of GPA is negative and significant with a t-statistic of -2.54 (corrected -2.58). The price of shocks to GPA is positive and insignificant.

Table 10 Entire Period Average $\widehat{\lambda_\gamma}$ Values and Significance for GPA, Portfolios Formed on Exposure to Level or Shocks to GPA: **Panel A** displays the average $\widehat{\lambda_\gamma}$ values when only the level of GPA is included in the regression. **Panel B** displays the average $\widehat{\lambda_\gamma}$ values when only the shocks to GPA is included in the regression. **Panel C** displays the average $\widehat{\lambda_\gamma}$ values when the level and shocks to GPA are included in the same regression. Panels D, E, and F correspond to Panels A, B, and C except that the estimated coefficients of the 5-Factors are included in the cross-sectional regressions alongside the measures of geopolitical actions. In all cases, the portfolios used in the cross-sectional regression are formed based on the measure of geopolitical risk used as the independent variable. For example, the portfolio returns used in Panel A are based off portfolios sorted according securities' exposures to the level of GPA.

Panel A			Panel B			Panel C					
$\widehat{\lambda\gamma_{level}}$	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{level}}$)	$\widehat{\lambda\gamma_{shock}}$	t($\widehat{\lambda\gamma_{shock}}$)	t($\widehat{\lambda\gamma_{shock}}$)	$\widehat{\lambda\gamma_{level}}$	$\widehat{\lambda\gamma_{shock}}$	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{shock}}$)	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{shock}}$)
-4.1	**-0.42**	*-0.45*	-12.2	**-1.44**	*-1.34*	7.4	-3.7	**1.25**	**-0.75**	*1.23*	*-0.72*

Panel D			Panel E			Panel F					
$\widehat{\lambda\gamma_{level}}$	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{level}}$)	$\widehat{\lambda\gamma_{shock}}$	t($\widehat{\lambda\gamma_{shock}}$)	t($\widehat{\lambda\gamma_{shock}}$)	$\widehat{\lambda\gamma_{level}}$	$\widehat{\lambda\gamma_{shock}}$	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{shock}}$)	t($\widehat{\lambda\gamma_{level}}$)	t($\widehat{\lambda\gamma_{shock}}$)
-5.4	**-0.72**	*-0.69*	-15.1	**-2.25**	*-2.11*	-13.9	9.1	**-2.54**	**1.60**	*-2.58*	*1.57*

6.2.4 Discussion and Comparison of Results from both Methodologies

The main goal of this second methodology is to confirm the results seen in the first methodology and to ensure that there was a significant dispersion in the marginal exposure of each portfolio to the given measure of geopolitical risk. We don't reinterpret these results outside of discussing if they are generally in agreement with our original methodology.

Complete agreement between the results from the original second-pass on the 25 Fama-French portfolios and the second-pass on our own portfolio sorts is not expected. As Chen et al. documented, different portfolio sorts tend to render significant results insignificant. They had to try several different portfolio sorts before settling on one that provided them with significant results in the cross-sectional regressions. We are mainly looking to see if the prices of geopolitical risk from this version of sorts refute our findings from before. By and large, the results are in agreement. Namely, we find again that the level of GPA is negatively and significantly priced. Furthermore, in the first methodology shocks to GPA were negatively priced in most periods and often neared significance over the entire period, though never becoming significant. In the second methodology, shocks to GPA is likewise negatively priced and broaches significance in one version of the cross-sectional regression.

In both methodologies, the price of the level and shocks to GPT doesn't ever broach significance over the entire period across any of the cross-sectional regressions. Correspondingly, looking at the Appendix tables 16 and 18, the price of the level and shocks to GPT tended to be more split between positive and negative values. While price of the level of GPT was largely negative and insignificant in the first methodology, it was mostly positive and insignificant in the second methodology.

These results largely confirm what we saw in the first methodology, and we maintain our conclusion that investors should care about their exposure to risks stemming from the level of geopolitical actions. In both methodologies, we have demonstrated that the level of geopolitical action has a statistically significant price when controlling for some of the most important asset-pricing factors, indicating that portfolios with varying exposures to this risk will have different expected returns.

6.2.5 A Final Observation

We noticed that the pricing of geopolitical risk is not very consistent from one Testing Period to another. For example, in the first methodology, the level of GPT is significantly and negatively priced in two of the Testing Periods. However, the level of GPT is often also positively priced, though not significantly. This is partly due to random variations in the samples, but we wonder if there are specific characteristics of a Testing Period that change the price of geopolitical risk. For example, we can casually observe that in both methodologies most measures of geopolitical risk are significantly priced in the 2003-2005 Testing Period. Coincidentally, this also marks the beginning of the second Iraq war. Could this be responsible for the increased price and significance of geopolitical risk during this time period? It certainly seems plausible to us. While for this study we largely focused on if geopolitical risk was priced over the entire period, it's clear that the pricing of geopolitical risk moves from period to period. This might be to blame for the price of the level and shocks to GPT being near or at significance in many individual periods, but never broaching significance over the entire period. If the relationship between geopolitical risk and returns is changing over time, then it would be more difficult to find a statistically significant relationship without accounting for this change. Future studies should more rigorously focus on asking if different periods are characterized by different premiums on geopolitical risk.

7 Conclusion and Areas for Further Study

We first examined the geopolitical risk indexes created by Caldara and Iacoveillo within the context of the Fama and French 5-factor model to determine if this risk is unique in explaining returns from known proxies of risk. A key distinction was made between the level of geopolitical risk and shocks to geopolitical risk. We found that levels and shocks to geopolitical risk lose most of their significance in explaining returns when controlling for the 5-factors. Furthermore, we found it can be important to disentangle the effects of the level of geopolitical risk and shocks to geopolitical risk. The level of geopolitical actions becomes statistically significant in explaining returns when shocks to geopolitical actions are controlled for.

We found the level of GPA is significantly and negatively priced even when controlling for the 5-factors, indicating that securities with a negative exposure to the level of GPA have higher expected returns. Likewise, the price shocks to GPA often verged on negative significance across entire periods and broached significance in the second methodology. We did not develop a theory for understanding the negative sign on the risk premium of the level of GPA. Further areas of study will likely consist of exploring why the exposure to measures of geopolitical action tends to affect future performance. We posited that perhaps increased levels of GPA leads to more future shocks to GPT, which depress returns. Or maybe investors find securities with a negative exposure to the level of GPA to be inherently more valuable since decreases in action might actually increase uncertainty and negatively exposed portfolios hedge against this possibility. In any case, there is strong reason to believe that exposure to the level of geopolitical action impacts expected returns.

Finally, we observed that often geopolitical risk was significantly priced in certain Testing Periods and not others. This pricing also tended to vary across periods between positive and negative values. We relied on the pricing of the entire period since the variations of pricing with lower sample sizes was high, but we wonder if there are specific characteristics of certain periods that change the price of geopolitical risk.

Future studies should first focus on developing a better model to estimate shocks to geopolitical risk. We used the AR(1) model proposed by Calara et al. and defended that it was somewhat representative of reality, but it's difficult to know how accurate our distinction between levels and shocks is without the assistance of a better model. Furthermore, future studies should examine if specific traits of portfolios make them more or less exposed to geopolitical risk. It makes sense to us, for example, that securities with a larger market capitalization might be more affected by geopolitical risk since they tend to have more international operations. Lastly, while we have demonstrated that the level of geopolitical actions is significantly priced over the entire period, there is still much to be done to understand if the price of geopolitical risk is dependent on the characteristics of the specific periods.

8 Appendix

Table 11 Characteristics of the 25 Fama-French Portfolios. ME indicates Size and BM indicates Book-Market value. The number 1 indicates the securities with the lowest value of the given characteristic are in that portfolio. For example, portfolio 25 contains securities with the intersection of the smallest Sizes and smallest Book-Market values. Portfolio 1 contains securities with the intersection of the largest Sizes and largest Book-Market values

Portfolio Number	Characteristics
25	ME1 BM1
24	ME1 BM2
23	ME1 BM3
22	ME1 BM4
21	ME1 BM5
20	ME2 BM1
19	ME2 BM2
18	ME2 BM3
17	ME2 BM4
16	ME2 BM5
15	ME3 BM1
14	ME3 BM2
13	ME3 BM3
12	ME3 BM4
11	ME3 BM5
10	ME4 BM1
9	ME4 BM2
8	ME4 BM3
7	ME4 BM4
6	ME4 BM5
5	ME5 BM1
4	ME5 BM2
3	ME5 BM3
2	ME5 BM4
1	ME5 MB5

Table 12 Regressions on Levels and Shocks to GPT and GPA

	25	24	23	22	21	20	19	18	17	16	15	14	13
GPT Only													
$\widehat{\gamma_{level}}$	-0.0021	-0.0035	-0.0032	-0.0027	-0.0033	0.0031	-0.0026	-0.0016	-0.0032	-0.0070	0.0005	-0.0020	-0.0039
t($\widehat{\gamma_{level}}$)	-0.30	-0.63	-0.65	-0.69	-0.75	0.44	-0.52	-0.37	-0.73	-1.40	1.36	-0.42	-0.86
GPT+Factors													
$\widehat{\gamma_{level}}$	-0.0022	-0.0024	-0.0011	-0.0002	0.0001	0.0025	-0.0010	0.0016	0.0010	-0.0013	-0.0004	0.0005	-0.0002
t($\widehat{\gamma_{level}}$)	-0.76	-1.20	-0.55	-0.13	0.05	1.09	-0.71	1.33	0.95	-0.96	-0.23	0.33	-0.13
GPA Only													
$\widehat{\gamma_{level}}$	0.0099	0.0065	0.0064	0.0052	0.0055	0.0107	0.0061	0.0047	0.0043	0.0043	0.0084	0.0053	0.0040
t($\widehat{\gamma_{level}}$)	1.41	1.14	1.31	1.29	1.17	1.49	1.08	0.98	0.88	0.69	0.33	1.04	0.81
GPA+Factors													
$\widehat{\gamma_{level}}$	0.0022	0.0003	0.0019	0.0014	0.0022	0.0026	0.0006	0.0011	0.0017	0.0018	0.0012	0.0014	0.0016
t($\widehat{\gamma_{level}}$)	0.84	0.19	1.19	0.94	1.14	1.59	0.41	0.87	1.38	1.10	0.66	0.96	0.85
GPTSHOCK Only													
$\widehat{\gamma_{shock}}$	-0.0213	-0.0167	-0.0165	-0.0122	-0.0132	-0.0119	-0.0143	-0.0109	-0.0142	-0.0178	-0.0124	-0.0121	-0.0145
t($\widehat{\gamma_{shock}}$)	-2.10	-1.84	-2.14	-1.83	-1.68	-1.05	-1.63	-1.38	-1.78	-1.90	2.41	-1.40	-1.85
GPTSHOCK+Factors													
$\widehat{\gamma_{shock}}$	-0.0073	-0.0039	-0.0045	-0.0012	-0.0001	0.0001	-0.0027	0.0008	-0.0014	-0.0021	-0.0021	-0.0004	-0.0022
t($\widehat{\gamma_{shock}}$)	-1.85	-1.52	-1.52	-0.46	-0.04	0.04	-1.61	0.58	-0.73	-0.83	-0.96	-0.20	-1.09
GPASHOCK Only													
$\widehat{\gamma_{shock}}$	-0.0015	-0.0024	-0.0022	-0.0014	-0.0018	0.0011	-0.0019	-0.0025	-0.0036	-0.0044	0.0002	-0.0005	-0.0029
t($\widehat{\gamma_{shock}}$)	-0.18	-0.33	-0.36	-0.27	-0.30	0.12	-0.28	-0.44	-0.59	-0.63	2.42	-0.08	-0.48
GPASHOCK+Factors													
$\widehat{\gamma_{shock}}$	0.0003	-0.0004	0.0004	0.0011	0.0018	0.0016	-0.0002	0.0002	0.0002	0.0008	0.0005	0.0021	0.0008
t($\widehat{\gamma_{shock}}$)	0.11	-0.19	0.20	0.71	0.83	1.09	-0.16	0.18	0.14	0.48	0.34	1.27	0.40

Table 13 Regressions on Levels and Shocks to GPT and GPA cont'd

	12	11	10	9	8	7	6	5	4	3	2	1
GPT Only												
$\widehat{\gamma_{level}}$	-0.0040	-0.0068	-0.0007	-0.0038	-0.0021	-0.0047	-0.0115	-0.0013	-0.0043	-0.0041	-0.0037	-0.0110
t($\widehat{\gamma_{level}}$)	-0.93	-1.31	-0.13	-0.88	-0.48	-1.12	-1.89	-0.29	-1.05	-1.30	-0.89	-2.79
GPT+ Factors												
$\widehat{\gamma_{level}}$	0.0008	-0.0008	-0.0004	-0.0001	0.0026	0.0004	-0.0048	0.0000	-0.0007	0.0007	0.0024	-0.0043
t($\widehat{\gamma_{level}}$)	0.50	-0.31	-0.25	-0.05	1.46	0.25	-1.56	-0.02	-0.64	0.59	1.43	-2.58
GPA Only												
$\widehat{\gamma_{level}}$	0.0047	0.0030	0.0063	0.0032	0.0039	0.0021	-0.0018	0.0029	0.0017	-0.0006	0.0015	-0.0052
t($\widehat{\gamma_{level}}$)	0.95	0.49	1.02	0.69	0.88	0.44	-0.27	0.63	0.41	-0.16	0.38	-1.13
GPA+Factors												
$\widehat{\gamma_{level}}$	0.003	0.002	0.001	0.001	0.003	0.002	-0.002	0.000	0.000	0.000	0.003	-0.004
t($\widehat{\gamma_{level}}$)	1.81	0.49	0.56	0.72	1.97	0.85	-0.60	-0.01	0.37	-0.30	1.84	-2.76
GPTSHOCK Only												
$\widehat{\gamma_{shock}}$	-0.0159	-0.0181	-0.0127	-0.0153	-0.0121	-0.0161	-0.0274	-0.0114	-0.0138	-0.0101	-0.0138	-0.0184
t($\widehat{\gamma_{shock}}$)	-2.08	-2.03	-1.39	-2.05	-1.56	-2.24	-2.67	-1.58	-2.00	-1.86	-2.16	-2.95
GPTSHOCK+Factors												
$\widehat{\gamma_{shock}}$	-0.0028	-0.0026	-0.0010	-0.0024	0.0017	-0.0018	-0.0100	-0.0001	-0.0016	0.0030	0.0009	-0.0023
t($\widehat{\gamma_{shock}}$)	-1.08	-0.77	-0.40	-1.02	0.69	-0.70	-2.12	-0.06	-0.85	1.64	0.39	-1.00
GPASHOCK Only												
$\widehat{\gamma_{shock}}$	-0.0025	-0.0057	-0.0013	-0.0044	-0.0032	-0.0047	-0.0099	-0.0045	-0.0048	-0.0059	-0.0037	-0.0103
t($\widehat{\gamma_{shock}}$)	-0.43	-0.81	-0.18	-0.77	-0.61	-0.88	-1.43	-0.81	-0.98	-1.51	-0.84	-2.35
GPASHOCK+Factors												
$\widehat{\gamma_{shock}}$	0.002	0.000	0.001	0.000	0.002	0.001	-0.003	-0.002	-0.001	-0.001	0.003	-0.003
t($\widehat{\gamma_{shock}}$)	1.01	-0.04	0.27	-0.18	1.00	0.38	-0.89	-1.19	-0.44	-0.53	1.65	-1.95

Table 14 Regressions on Levels and Shocks to GPT and GPA Included in Same Regression

	25	24	23	22	21	20	19	18	17	16	15	14	13
GPT + GPTSHOCK Only													
$\widehat{\gamma_{level}}$	0.0095	0.0049	0.0052	0.0034	0.0032	0.0109	0.0046	0.0041	0.0039	0.0010	0.0077	0.0042	0.0031
$\widehat{\gamma_{shock}}$	-0.0213	-0.0167	-0.0165	-0.0122	-0.0132	-0.0118	-0.0142	-0.0109	-0.0142	-0.0178	-0.0124	-0.0121	-0.0145
t($\widehat{\gamma_{level}}$)	1.54	0.97	1.14	0.93	0.82	1.82	1.01	1.03	1.05	0.20	0.36	1.05	0.80
t($\widehat{\gamma_{shock}}$)	-2.27	-1.92	-2.25	-1.90	-1.73	-1.10	-1.69	-1.43	-1.84	-1.92	-1.31	-1.45	-1.89
GPT+GPTSHOCK+Factors													
$\widehat{\gamma_{level}}$	0.0012	-0.0010	0.0011	0.0004	0.0002	0.0032	0.0002	0.0016	0.0021	-0.0005	0.0006	0.0009	0.0009
$\widehat{\gamma_{shock}}$	-0.0073	-0.0039	-0.0045	-0.0012	-0.0001	0.0001	-0.0027	0.0008	-0.0014	-0.0021	-0.0021	-0.0004	-0.0022
t($\widehat{\gamma_{level}}$)	0.44	-0.54	0.54	0.27	0.11	1.54	0.12	1.21	2.39	-0.34	0.36	0.59	0.58
t($\widehat{\gamma_{shock}}$)	-1.86	-1.48	-1.53	-0.45	-0.04	0.03	-1.61	0.62	-0.73	-0.83	-0.95	-0.21	-1.10
GPA + GPASHOCK Only													
$\widehat{\gamma_{level}}$	0.0351	0.0262	0.0254	0.0197	0.0216	0.0321	0.0239	0.0207	0.0218	0.0233	0.0267	0.0183	0.0192
$\widehat{\gamma_{shock}}$	-0.0016	-0.0024	-0.0022	-0.0014	-0.0019	0.0010	-0.0020	-0.0026	-0.0036	-0.0044	0.0002	-0.0005	-0.0029
t($\widehat{\gamma_{level}}$)	2.84	3.02	3.27	3.42	3.16	3.31	3.19	3.46	3.52	2.80	-1.59	2.95	3.49
t($\widehat{\gamma_{shock}}$)	-0.22	-0.37	-0.40	-0.30	-0.32	0.13	-0.31	-0.48	-0.63	-0.67	0.02	-0.09	-0.53
GPA+GPASHOCK+Factors													
$\widehat{\gamma_{level}}$	0.0064	0.0020	0.0053	0.0021	0.0032	0.0049	0.0024	0.0030	0.0051	0.0039	0.0026	-0.0001	0.0034
$\widehat{\gamma_{shock}}$	0.0003	-0.0004	0.0004	0.0011	0.0018	0.0016	-0.0002	0.0002	0.0002	0.0008	0.0005	0.0021	0.0008
t($\widehat{\gamma_{level}}$)	1.07	0.58	1.57	0.77	0.89	1.55	0.87	1.38	2.42	1.32	0.83	-0.03	1.20
t($\widehat{\gamma_{shock}}$)	0.11	-0.18	0.20	0.73	0.82	1.14	-0.16	0.18	0.14	0.47	0.35	1.27	0.41

Table 15 Regressions on Levels and Shocks to GPT and GPA Included in Same Regression cont'd

	12	11	10	9	8	7	6	5	4	3	2	1
GPT + GPTSHOCK Only												
$\widehat{\gamma_{level}}$	0.0038	0.0013	0.0063	0.0036	0.0041	0.0030	0.0005	0.0049	0.0022	0.0003	0.0031	-0.0039
$\widehat{\gamma_{shock}}$	-0.0159	-0.0181	-0.0126	-0.0153	-0.0121	-0.0161	-0.0274	-0.0114	-0.0138	-0.0102	-0.0138	-0.0184
t($\widehat{\gamma_{level}}$)	0.91	0.28	1.35	1.01	1.07	0.86	0.10	1.42	0.72	0.12	0.96	-0.98
t($\widehat{\gamma_{shock}}$)	-2.17	-2.05	-1.45	-2.13	-1.62	-2.31	-2.68	-1.65	-2.04	-1.87	-2.20	-2.86
GPT+GPTSHOCK+Factors												
$\widehat{\gamma_{level}}$	0.0026	0.0004	0.0000	0.0012	0.0024	0.0015	-0.0006	0.0000	-0.0001	-0.0008	0.0027	-0.0044
$\widehat{\gamma_{shock}}$	-0.0028	-0.0026	-0.0010	-0.0024	0.0017	-0.0018	-0.0100	-0.0001	-0.0016	0.0030	0.0009	-0.0023
t($\widehat{\gamma_{level}}$)	1.55	0.16	-0.02	0.85	1.45	1.20	-0.22	0.03	-0.06	-0.75	2.00	-2.79
t($\widehat{\gamma_{shock}}$)	-1.15	-0.78	-0.40	-1.03	0.73	-0.71	-2.11	-0.06	-0.84	1.68	0.37	-1.11
GPA + GPASHOCK Only												
$\widehat{\gamma_{level}}$	0.0207	0.0221	0.0233	0.0201	0.0195	0.0169	0.0159	0.0192	0.0160	0.0113	0.0130	0.0057
$\widehat{\gamma_{shock}}$	-0.0026	-0.0057	-0.0014	-0.0044	-0.0032	-0.0047	-0.0100	-0.0045	-0.0048	-0.0060	-0.0037	-0.0103
t($\widehat{\gamma_{level}}$)	3.41	2.81	3.13	3.40	3.54	2.95	1.85	3.59	3.26	2.45	2.45	0.76
t($\widehat{\gamma_{shock}}$)	-0.48	-0.88	-0.20	-0.84	-0.66	-0.94	-1.49	-0.89	-1.05	-1.57	-0.88	-2.38
GPA+GPASHOCK+Factors												
$\widehat{\gamma_{level}}$	0.0061	0.0056	0.0023	0.0051	0.0050	0.0035	0.0002	0.0034	0.0031	0.0005	0.0025	-0.0064
$\widehat{\gamma_{shock}}$	0.0020	-0.0002	0.0005	-0.0003	0.0016	0.0008	-0.0026	-0.0016	-0.0007	-0.0007	0.0029	-0.0030
t($\widehat{\gamma_{level}}$)	2.41	1.08	0.76	1.55	2.05	1.28	0.05	1.89	1.50	0.20	1.01	-1.98
t($\widehat{\gamma_{shock}}$)	1.09	-0.06	0.27	-0.18	1.00	0.39	-0.89	-1.27	-0.45	-0.52	1.67	-1.92

Table 16 Testing Period Average $\widehat{\lambda_\gamma}$ Values and Significance for GPT: **Panel A** displays the average $\widehat{\lambda_\gamma}$ values when only the level of GPT is included in the regression. **Panel B** displays the average $\widehat{\lambda_\gamma}$ values when only the shocks to GPT is included in the regression. **Panel C** displays the average $\widehat{\lambda_\gamma}$ values when the level and shocks to GPT are included in the same regression. Panels D, E, and F correspond to Panels A, B, and C except that the estimated coefficients of the 5-Factors are included in the cross sectional regressions alongside the measures of geopolitical threats

	1988-90	1991-93	1994-96	1997-99	2000-02	2003-05	2006-08	2009-11	2012-14	2015-16	Entire Period
Panel A											
$\widehat{\lambda_{\gamma_{level}}}$	-5.1	-63.7	-4.7	4.1	-24.2	-17.5	-10.3	16.5	-3.5	-16.6	-12.4
$t(\widehat{\lambda_{\gamma_{level}}})$	**-0.69**	**-2.12**	**-0.25**	**0.43**	**-0.99**	**-0.88**	**-0.26**	**1.25**	**-0.36**	**-0.45**	**-1.75**
$t(\widehat{\lambda_{\gamma_{level}}})$	*-0.47*	*-1.83*	*-0.18*	*0.46*	*-0.79*	*-0.72*	*-0.24*	*1.00*	*-0.54*	*-0.53*	*-1.54*
Panel B											
$\widehat{\lambda_{\gamma_{shock}}}$	-2.2	-45.8	14.4	-3.2	15.4	-15.4	8.3	12.4	-3.3	-29.8	-4.1
$t(\widehat{\lambda_{\gamma_{shock}}})$	**-0.29**	**-1.74**	**1.24**	**-0.20**	**0.35**	**-1.03**	**0.52**	**1.02**	**-0.38**	**-1.31**	**-0.56**
$t(\widehat{\lambda_{\gamma_{shock}}})$	*-0.21*	*-1.75*	*1.52*	*-0.25*	*0.34*	*-1.02*	*0.60*	*0.95*	*-0.54*	*-1.41*	*-0.62*
Panel C											
$\widehat{\lambda_{\gamma_{level}}}$	-67.4	11.6	-5.3	-1.4	-5.8	-14.1	-2.1	4.8	-1.4	-15.4	-9.43
$\widehat{\lambda_{\gamma_{shock}}}$	5.5	-33.6	13.0	-4.3	13.8	-17.1	8.2	11.6	-3.8	-18.0	-1.93
$t(\widehat{\lambda_{\gamma_{level}}})$	**-1.33**	**0.63**	**-0.22**	**-0.06**	**-0.20**	**-0.66**	**-0.07**	**0.27**	**-0.21**	**-0.56**	**-1.11**
$t(\widehat{\lambda_{\gamma_{shock}}})$	**0.68**	**-1.80**	**1.16**	**-0.28**	**0.34**	**-1.13**	**0.46**	**1.09**	**-0.44**	**-0.59**	**-0.32**
$t(\widehat{\lambda_{\gamma_{level}}})$	*-1.04*	*0.63*	*-0.16*	*-0.05*	*-0.20*	*-0.59*	*-0.06*	*0.25*	*-0.23*	*-0.67*	*-0.96*
$t(\widehat{\lambda_{\gamma_{shock}}})$	*0.58*	*-1.62*	*1.40*	*-0.35*	*0.30*	*-1.07*	*0.51*	*1.03*	*-0.51*	*-0.70*	*-0.30*
Panel D											
$\widehat{\lambda_{\gamma_{level}}}$	-17.4	-4.8	2.8	-3.2	9.1	-38.4	9.8	13.9	-5.9	2.9	-3.3
$t(\widehat{\lambda_{\gamma_{level}}})$	**-2.76**	**-0.46**	**0.43**	**-0.37**	**0.39**	**-1.34**	**0.25**	**1.51**	**-1.10**	**0.12**	**-0.55**
$t(\widehat{\lambda_{\gamma_{level}}})$	*-3.59*	*-0.46*	*0.36*	*-0.38*	*0.37*	*-1.05*	*0.37*	*1.17*	*-1.23*	*0.15*	*-0.60*
Panel E											
$\widehat{\lambda_{\gamma_{shock}}}$	-17.9	-2.7	22.4	7.1	15.7	-17.6	21.7	15.5	-6.9	-14.8	2.8
$t(\widehat{\lambda_{\gamma_{shock}}})$	**-2.65**	**-0.33**	**3.82**	**0.95**	**0.63**	**-0.75**	**1.59**	**1.27**	**-1.25**	**-0.96**	**0.57**
$t(\widehat{\lambda_{\gamma_{shock}}})$	*-2.82*	*-0.28*	*3.48*	*1.18*	*0.74*	*-0.49*	*2.05*	*1.05*	*-1.58*	*-0.81*	*0.59*
Panel F											
$\widehat{\lambda_{\gamma_{level}}}$	-86.5	4.5	-3.8	-5.7	43.5	-60.8	-23.5	11.3	-6.2	-3.1	-13.38
$\widehat{\lambda_{\gamma_{shock}}}$	-19.6	-3.4	22.8	5.4	15.2	-13.8	19.3	15.6	-7.9	-12.8	2.58
$t(\widehat{\lambda_{\gamma_{level}}})$	**-2.26**	**0.33**	**-0.31**	**-0.46**	**1.50**	**-2.62**	**-0.84**	**0.66**	**-1.03**	**-0.18**	**-1.90**
$t(\widehat{\lambda_{\gamma_{shock}}})$	**-2.88**	**-0.42**	**4.02**	**0.65**	**0.63**	**-0.60**	**1.36**	**1.35**	**-1.41**	**-0.65**	**0.58**
$t(\widehat{\lambda_{\gamma_{level}}})$	*-1.80*	*0.34*	*-0.26*	*-0.53*	*1.52*	*-2.27*	*-1.04*	*0.66*	*-1.02*	*-0.23*	*-1.68*
$t(\widehat{\lambda_{\gamma_{shock}}})$	*-2.81*	*-0.33*	*3.41*	*0.76*	*0.71*	*-0.38*	*1.92*	*1.07*	*-1.83*	*-0.58*	*0.54*

Table 17 Testing Period Average $\widehat{\lambda_\gamma}$ Values and Significance for GPA: **Panel A** displays the average $\widehat{\lambda_\gamma}$ values when only the level of GPA is included in the regression. **Panel B** displays the average $\widehat{\lambda_\gamma}$ values when only the shocks to GPA is included in the regression. **Panel C** displays the average $\widehat{\lambda_\gamma}$ values when the level and shocks to GPA are included in the same regression. Panels D, E, and F correspond to Panels A, B, and C except that the estimated coefficients of the 5-Factors are included in the cross sectional regressions alongside the measures of geopolitical action

	1988-90	1991-93	1994-96	1997-99	2000-02	2003-05	2006-08	2009-11	2012-14	2015-16	Entire Period
Panel A											
$\widehat{\lambda_{\gamma_{level}}}$	-43.9	34.8	-8.9	-8.2	-21.4	-7.3	-5.4	-7.7	0.0	-12.7	-7.9
$t(\widehat{\lambda_{\gamma_{level}}})$	**-0.95**	**1.43**	**-0.37**	**-0.34**	**-0.74**	**-0.34**	**-0.21**	**-0.40**	**0.00**	**-0.49**	**-0.97**
$t(\widehat{\lambda_{\gamma_{level}}})$	*-0.70*	*1.46*	*-0.27*	*-0.30*	*-0.78*	*-0.28*	*-0.19*	*-0.37*	*0.01*	*-0.54*	*-0.83*
Panel B											
$\widehat{\lambda_{\gamma_{shock}}}$	-55.5	28.4	-6.2	-39.4	11.8	-18.8	45.5	-15.7	-1.1	-3.2	-5.5
$t(\widehat{\lambda_{\gamma_{shock}}})$	**-1.09**	**1.19**	**-0.25**	**-1.22**	**0.39**	**-1.06**	**1.68**	**-1.00**	**-0.19**	**-0.20**	**-0.57**
$t(\widehat{\lambda_{\gamma_{shock}}})$	*-0.74*	*1.22*	*-0.18*	*-0.93*	*0.44*	*-0.99*	*1.57*	*-1.10*	*-0.23*	*-0.24*	*-0.51*
Panel C											
$\widehat{\lambda_{\gamma_{level}}}$	-41.3	17.4	-4.3	-32.6	29.0	-19.6	25.0	-12.2	2.1	-17.8	-5.0
$\widehat{\lambda_{\gamma_{shock}}}$	-79.4	-6.9	5.4	-39.7	46.6	-25.2	34.1	-15.8	-0.6	-15.7	-9.5
$t(\widehat{\lambda_{\gamma_{level}}})$	**-1.00**	**0.97**	**-0.19**	**-1.34**	**0.99**	**-0.92**	**0.83**	**-0.64**	**0.26**	**-0.72**	**-0.64**
$t(\widehat{\lambda_{\gamma_{shock}}})$	**-1.47**	**-0.46**	**0.32**	**-1.47**	**1.52**	**-1.34**	**1.26**	**-1.01**	**-0.10**	**-0.75**	**-1.13**
$t(\widehat{\lambda_{\gamma_{level}}})$	*-0.70*	*0.99*	*-0.14*	*-1.28*	*1.11*	*-0.84*	*0.76*	*-0.63*	*0.41*	*-0.81*	*-0.55*
$t(\widehat{\lambda_{\gamma_{shock}}})$	*-1.00*	*-0.38*	*0.31*	*-1.29*	*1.60*	*-1.33*	*1.15*	*-1.15*	*-0.12*	*-0.74*	*-0.91*
Panel D											
$\widehat{\lambda_{\gamma_{level}}}$	-110.4	5.4	-7.8	-6.1	44.2	-52.5	-29.8	11.2	-5.1	-5.0	-16.0
$t(\widehat{\lambda_{\gamma_{level}}})$	**-2.72**	**0.42**	**-0.64**	**-0.51**	**1.54**	**-2.13**	**-1.11**	**0.71**	**-0.89**	**-0.32**	**-2.23**
$t(\widehat{\lambda_{\gamma_{level}}})$	*-2.85*	*0.41*	*-0.55*	*-0.62*	*1.53*	*-1.87*	*-1.20*	*0.72*	*-0.82*	*-0.40*	*-2.07*
Panel E											
$\widehat{\lambda_{\gamma_{shock}}}$	-67.9	0.1	2.8	-0.4	37.0	-48.3	-5.9	20.0	-5.6	-5.5	-7.5
$t(\widehat{\lambda_{\gamma_{shock}}})$	**-2.06**	**0.01**	**0.26**	**-0.03**	**1.52**	**-2.13**	**-0.29**	**1.12**	**-1.29**	**-0.52**	**-1.10**
$t(\widehat{\lambda_{\gamma_{shock}}})$	*-1.83*	*0.01*	*0.24*	*-0.03*	*1.68*	*-1.48*	*-0.41*	*1.13*	*-1.17*	*-0.69*	*-1.13*
Panel F											
$\widehat{\lambda_{\gamma_{level}}}$	-102.9	8.4	-6.0	-2.9	42.1	-73.5	-34.6	12.0	-2.9	-2.7	-16.8
$\widehat{\lambda_{\gamma_{shock}}}$	-75.0	-1.8	8.0	-1.3	39.3	-43.5	-13.4	21.1	-4.9	-4.1	-7.7
$t(\widehat{\lambda_{\gamma_{level}}})$	**-3.15**	**0.67**	**-0.48**	**-0.23**	**1.44**	**-3.02**	**-1.28**	**0.73**	**-0.47**	**-0.18**	**-2.46**
$t(\widehat{\lambda_{\gamma_{shock}}})$	**-2.42**	**-0.17**	**0.77**	**-0.10**	**1.63**	**-1.77**	**-0.59**	**1.31**	**-1.04**	**-0.37**	**-1.27**
$t(\widehat{\lambda_{\gamma_{level}}})$	*-3.19*	*0.66*	*-0.43*	*-0.27*	*1.43*	*-2.31*	*-1.34*	*0.77*	*-0.48*	*-0.21*	*-2.18*
$t(\widehat{\lambda_{\gamma_{shock}}})$	*-2.19*	*-0.19*	*0.78*	*-0.10*	*1.80*	*-1.19*	*-0.72*	*1.26*	*-0.94*	*-0.39*	*-1.13*

Table 18 Testing Period Average $\widehat{\lambda_\gamma}$ Values and Significance for GPT, Portfolios Formed on Exposure to Level or Shocks to GPT: **Panel A** displays the average $\widehat{\lambda_\gamma}$ values when only the level of GPT is included in the regression. **Panel B** displays the average $\widehat{\lambda_\gamma}$ values when only the shocks to GPT is included in the regression. **Panel C** displays the average $\widehat{\lambda_\gamma}$ values when the level and shocks to GPT are included in the same regression. Panels D, E, and F correspond to Panels A, B, and C except that the estimated coefficients of the 5-Factors are included in the cross-sectional regressions alongside the measures of geopolitical threats. In all cases, the portfolios used in the cross-sectional regression are formed based on the measure of geopolitical risk used as the independent variable. For example, the portfolio returns used in Panel A are based off portfolios sorted according securities' exposures to the level of GPT.

	1991-93	1994-96	1997-99	2000-02	2003-05	2006-08	2009-11	2012-14	2015-16	Entire Period
Panel A										
$\widehat{\lambda_{\gamma_{level}}}$	-11.4	-2.3	-9.0	-31.4	157.9	12.4	-35.3	-10.9	-27.8	5.9
t($\widehat{\lambda_{\gamma_{level}}}$)	**-0.54**	**-0.31**	**-1.29**	**-0.58**	**2.48**	**0.43**	**-2.15**	**-1.49**	**-0.89**	**0.53**
t($\lambda_{\gamma_{level}}$)	*-0.46*	*-0.25*	*-1.45*	*-0.54*	*1.96*	*0.41*	*-2.09*	*-1.16*	*-0.85*	*0.48*
Panel B										
$\widehat{\lambda_{\gamma_{shock}}}$	24.8	-4.7	-4.8	2.1	-3.7	-19.9	-8.1	-2.4	105.1	6.2
t($\widehat{\lambda_{\gamma_{shock}}}$)	**1.54**	**-0.66**	**-0.87**	**0.10**	**-0.38**	**-1.38**	**-0.97**	**-0.29**	**1.99**	**0.96**
t($\lambda_{\gamma_{shock}}$)	*1.41*	*-0.60*	*-0.77*	*0.07*	*-0.26*	*-1.13*	*-0.90*	*-0.24*	*2.51*	*0.95*
Panel C										
$\widehat{\lambda_{\gamma_{level}}}$	53.1	3.4	-5.3	-15.9	67.3	-2.9	-6.9	-6.4	10.7	10.8
$\widehat{\lambda_{\gamma_{shock}}}$	-21.7	16.3	-3.9	1.5	40.9	20.0	-18.6	1.0	-85.2	-2.4
t($\widehat{\lambda_{\gamma_{level}}}$)	**1.60**	**0.46**	**-1.20**	**-0.59**	**1.90**	**-0.14**	**-1.08**	**-1.53**	**0.95**	**1.55**
t($\widehat{\lambda_{\gamma_{shock}}}$)	**-1.35**	**1.13**	**-0.48**	**0.06**	**1.86**	**0.79**	**-1.85**	**0.13**	**-1.80**	**-0.35**
t($\lambda_{\gamma_{level}}$)	*1.32*	*0.39*	*-0.87*	*-0.62*	*1.73*	*-0.12*	*-0.95*	*-1.61*	*0.81*	*1.40*
t($\lambda_{\gamma_{shock}}$)	*-1.38*	*0.83*	*-0.41*	*0.04*	*1.91*	*0.67*	*-1.91*	*0.10*	*-1.57*	*-0.30*
Panel D										
$\widehat{\lambda_{\gamma_{level}}}$	21.0	10.2	-7.3	-43.4	92.2	-10.5	-11.7	-14.9	-77.3	-1.8
t($\widehat{\lambda_{\gamma_{level}}}$)	**1.01**	**2.24**	**-1.26**	**-0.98**	**2.13**	**-0.34**	**-0.88**	**-1.50**	**-0.94**	**-0.17**
t($\lambda_{\gamma_{level}}$)	*0.86*	*1.96*	*-1.47*	*-1.00*	*2.18*	*-0.25*	*-0.88*	*-1.56*	*-0.90*	*-0.17*
Panel E										
$\widehat{\lambda_{\gamma_{shock}}}$	0.6	-6.0	2.0	-1.8	61.1	-11.4	-5.8	8.9	-7.6	4.9
t($\widehat{\lambda_{\gamma_{shock}}}$)	**0.03**	**-0.57**	**0.50**	**-0.09**	**2.71**	**-0.56**	**-0.65**	**1.42**	**-0.34**	**0.91**
t($\lambda_{\gamma_{shock}}$)	*0.03*	*-0.60*	*0.37*	*-0.11*	*1.44*	*-0.70*	*-0.84*	*1.30*	*-0.32*	*0.79*
Panel F										
$\widehat{\lambda_{\gamma_{level}}}$	77.6	11.0	-3.6	-5.9	16.8	-6.0	9.8	-1.3	-7.0	10.8
$\widehat{\lambda_{\gamma_{shock}}}$	-33.5	19.1	-3.5	-37.9	99.7	-6.7	-21.9	-12.3	-76.5	-5.5
t($\widehat{\lambda_{\gamma_{level}}}$)	**2.42**	**2.39**	**-0.75**	**-0.28**	**0.42**	**-0.36**	**1.47**	**-0.33**	**-0.22**	**1.52**
t($\widehat{\lambda_{\gamma_{shock}}}$)	**-1.57**	**1.69**	**-0.48**	**-1.15**	**2.88**	**-0.16**	**-1.67**	**-1.62**	**-1.28**	**-0.59**
t($\lambda_{\gamma_{level}}$)	*1.90*	*2.15*	*-0.57*	*-0.28*	*0.47*	*-0.31*	*1.41*	*-0.31*	*-0.18*	*1.42*
t($\lambda_{\gamma_{shock}}$)	*-1.33*	*1.31*	*-0.41*	*-1.27*	*2.57*	*-0.15*	*-1.55*	*-1.63*	*-1.23*	*-0.54*

Table 19 Testing Period Average $\widehat{\lambda_\gamma}$ Values and Significance for GPA, Portfolios Formed on Exposure to Level or Shocks to GPA: **Panel A** displays the average $\widehat{\lambda_\gamma}$ values when only the level of GPA is included in the regression. **Panel B** displays the average $\widehat{\lambda_\gamma}$ values when only the shocks to GPA is included in the regression. **Panel C** displays the average $\widehat{\lambda_\gamma}$ values when the level and shocks to GPA are included in the same regression. Panels D, E, and F correspond to Panels A, B, and C except that the estimated coefficients of the 5-Factors are included in the cross-sectional regressions alongside the measures of geopolitical actions. In all cases, the portfolios used in the cross-sectional regression are formed based on the measure of geopolitical risk used as the independent variable. For example, the portfolio returns used in Panel A are based off portfolios sorted according securities' exposures to the level of GPA.

	1991-93	1994-96	1997-99	2000-02	2003-05	2006-08	2009-11	2012-14	2015-16	Entire Period
Panel A										
$\widehat{\lambda_{\gamma_{level}}}$	37.2	-4.2	2.2	-50.9	75.9	-16.4	-42.0	2.1	-58.9	-4.1
t($\widehat{\lambda_{\gamma_{level}}}$)	**1.35**	**-0.36**	**0.17**	**-0.92**	**1.94**	**-0.54**	**-2.99**	**0.41**	**-1.76**	**-0.42**
t($\lambda_{\gamma_{level}}$)	*1.51*	*-0.46*	*0.13*	*-1.14*	*1.73*	*-0.45*	*-2.89*	*0.42*	*-1.90*	*-0.45*
Panel B										
$\widehat{\lambda_{\gamma_{shock}}}$	-32.9	3.0	-7.2	52.4	-77.0	19.6	-39.7	1.5	-37.8	-12.2
t($\widehat{\lambda_{\gamma_{shock}}}$)	**-2.61**	**0.28**	**-0.66**	**1.21**	**-2.15**	**0.66**	**-1.75**	**0.35**	**-1.53**	**-1.44**
$\lambda_{\gamma_{shock}}$	*-3.02*	*0.24*	*-0.59*	*1.37*	*-1.86*	*0.44*	*-1.98*	*0.39*	*-1.53*	*-1.34*
Panel C										
$\widehat{\lambda_{\gamma_{level}}}$	53.1	17.8	3.8	-25.0	24.7	-2.6	8.5	-4.4	-18.1	7.4
$\widehat{\lambda_{\gamma_{shock}}}$	29.5	-1.1	3.5	8.3	-28.3	-5.0	-41.6	2.3	0.5	-3.7
t($\widehat{\lambda_{\gamma_{level}}}$)	**1.73**	**1.15**	**0.63**	**-1.05**	**1.22**	**-0.23**	**0.56**	**-0.69**	**-1.58**	**1.25**
t($\widehat{\lambda_{\gamma_{shock}}}$)	**1.77**	**-0.13**	**0.47**	**0.91**	**-1.16**	**-0.32**	**-2.74**	**0.33**	**0.02**	**-0.75**
t($\lambda_{\gamma_{level}}$)	*1.75*	*1.30*	*0.62*	*-1.27*	*1.11*	*-0.18*	*0.42*	*-0.72*	*-1.38*	*1.23*
t($\lambda_{\gamma_{shock}}$)	*1.90*	*-0.15*	*0.40*	*1.19*	*-1.00*	*-0.32*	*-2.85*	*0.40*	*0.02*	*-0.72*
Panel D										
$\widehat{\lambda_{\gamma_{level}}}$	23.6	-2.9	26.0	-15.8	-101.3	28.3	-9.7	-0.1	7.6	-5.4
t($\widehat{\lambda_{\gamma_{level}}}$)	**1.38**	**-0.17**	**2.00**	**-0.56**	**-2.45**	**1.35**	**-0.78**	**-0.01**	**0.30**	**-0.72**
t($\lambda_{\gamma_{level}}$)	*1.47*	*-0.22*	*1.82*	*-0.91*	*-1.99*	*1.07*	*-0.66*	*-0.01*	*0.43*	*-0.69*
Panel E										
$\widehat{\lambda_{\gamma_{shock}}}$	-58.7	-4.1	-4.8	-32.6	5.3	-2.8	-24.4	-1.3	-11.7	-15.1
t($\widehat{\lambda_{\gamma_{shock}}}$)	**-2.73**	**-0.28**	**-0.37**	**-1.49**	**0.22**	**-0.09**	**-1.28**	**-0.44**	**-0.66**	**-2.25**
t($\lambda_{\gamma_{shock}}$)	*-3.23*	*-0.25*	*-0.28*	*-1.59*	*0.25*	*-0.06*	*-1.23*	*-0.39*	*-0.77*	*-2.11*
Panel F										
$\widehat{\lambda_{\gamma_{level}}}$	17.5	-10.2	0.6	-5.9	-86.0	-7.6	-15.6	4.6	-26.2	-13.9
$\widehat{\lambda_{\gamma_{shock}}}$	18.1	2.4	26.9	-9.8	-8.8	37.2	1.6	0.4	16.7	9.1
t($\widehat{\lambda_{\gamma_{level}}}$)	**1.25**	**-0.43**	**0.13**	**-0.30**	**-3.81**	**-0.48**	**-1.42**	**0.71**	**-1.59**	**-2.54**
t($\widehat{\lambda_{\gamma_{shock}}}$)	**1.27**	**0.23**	**2.22**	**-0.65**	**-0.29**	**1.55**	**0.14**	**0.08**	**0.70**	**1.60**
t($\lambda_{\gamma_{level}}$)	*1.71*	*-0.53*	*0.12*	*-0.41*	*-3.63*	*-0.48*	*-1.38*	*0.64*	*-1.68*	*-2.58*
t($\lambda_{\gamma_{shock}}$)	*1.26*	*0.27*	*1.80*	*-1.08*	*-0.27*	*1.19*	*0.14*	*0.08*	*0.91*	*1.57*

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